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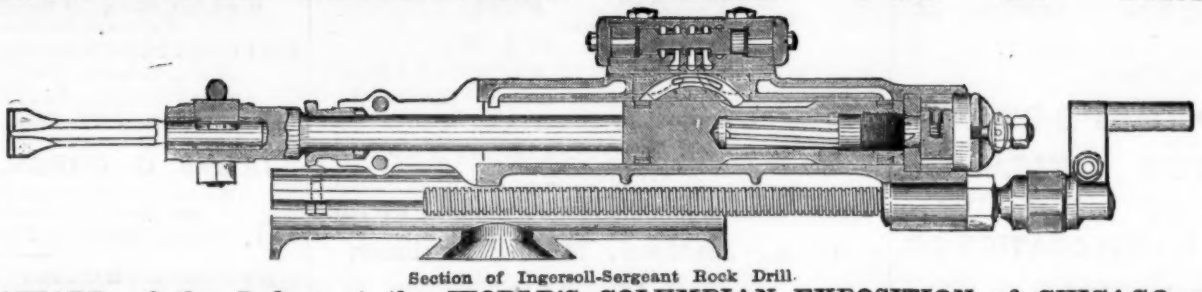

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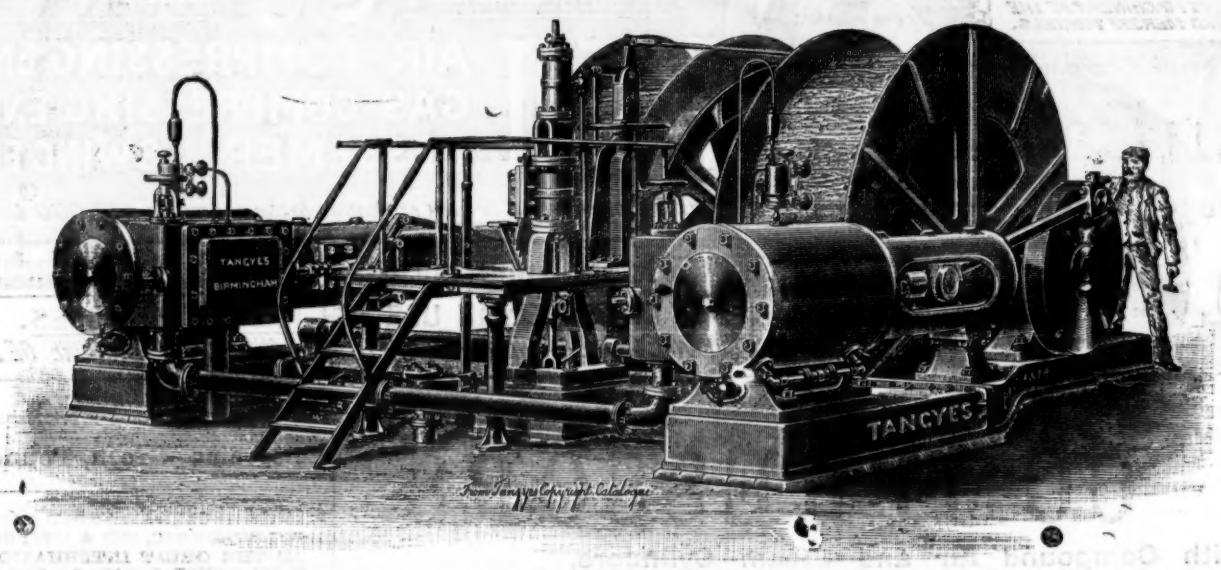

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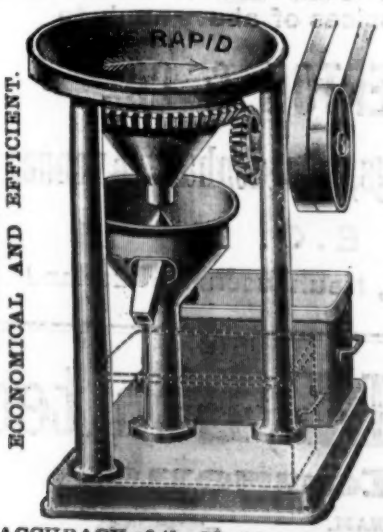

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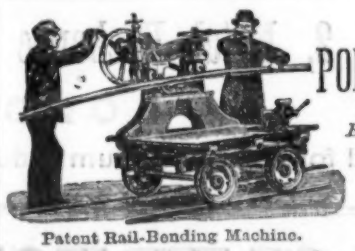

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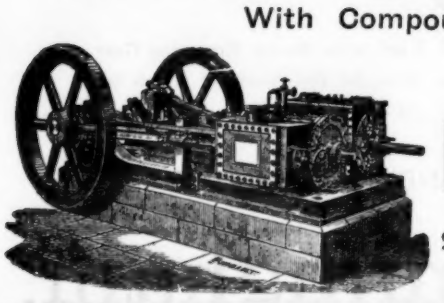

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SILVER MEDALS AWARDED AT THE ROYAL CORNWALL POLYTECHNIC, 1872 & 1876; GOLD MEDAL AWARDED AT THE GREAT INTERNATIONAL MINING EXHIBITION, CRYSTAL PALACE, 1890.

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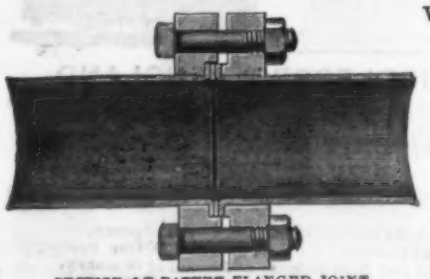

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Light Lap-welded Wrought-iron and Steel Tubes
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With Patent Flanged Joints (as illustrated) for the Conveyance of Water, Steam, and Air, at High and Low Pressures.
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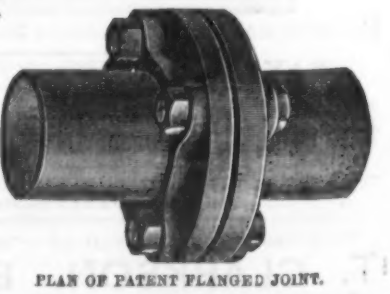
FOR LOCOMOTIVE, MARINE, AND OTHER MULTITUBULAR BOILERS.
STEEL & IRON PLATES FOR BOILERS, BRIDGES, &c.



PLAN OF PATENT FLANGED JOINT.

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ESTABLISHED 1839

Patentees and Sole Makers of

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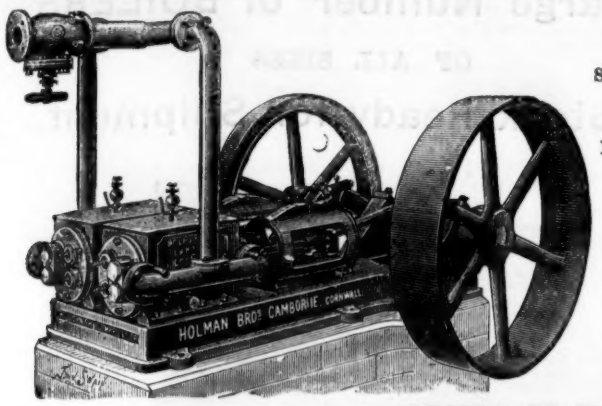


FIRST SILVER MEDAL, Highest Award, Mining Institute Contest, 1881.

Three Makers represented.

FIRST SILVER MEDAL Highest Award, Royal Cornwall Polytechnic Jubilee Exhibition Contest, 1882.

Five Makers represented.

AWARDED SILVER MEDAL INTERNATIONAL INVENTIONS EXHIBITION, 1885.

RECORD OF WORK DONE

At Botallack Mine, St. Just, Cornwall, **TWELVE MEN** with **TWO** new Patent **CORNISH ROCK DRILLS** drove, sunk, and rose **288 FATHOMS** in **12 MONTHS,** equal to five times the Speed of Hand Labour

At Wheal Grenville Mine, Camborne, Cornwall, **SIX MEN** with **TWO** new Patent **CORNISH ROCK DRILLS** started from the **150 FATHOMS** level and put up in **EIGHT MONTHS** a **11 FEET** by **5 FEET PERPENDICULAR RISE 46 FATHOMS 5 FEET 6 INCHES,** and about midway drove **1 FATHOM 5 FT.** No communication of any kind was effected until holing to the Shaft brought down from surface.

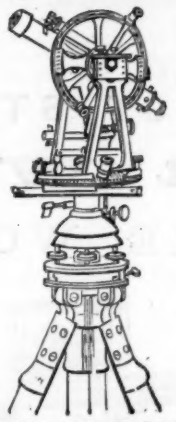
Estimates for ROCK BORING PLANT and GENERAL MINING MACHINERY on Application.

London Representative: Mr. E. M. TOUZEAU, Leadenhall Buildings, London, E.C.

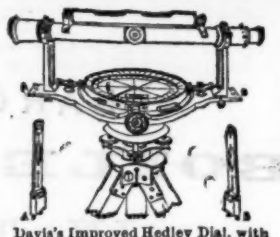
JOHN DAVIS AND SON,

ALL SAINTS WORKS, DERBY;

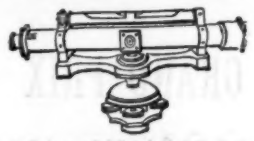
118, NEWGATE STREET, LONDON.



Transit Theodolite with Patent Hoffman Tripod Head, and Trough Compass.



Davis's Improved Hedley Dial, with Telescope and Sights Interchangeable and Patent Hoffman Tripod Head.



Dumpy Level with Hoffman Patent Tripod Head.

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THEODOLITES. LEVELS.

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SECTION (A) MATHEMATICAL DEPARTMENT AND SAFETY LAMPS.
SECTION (B) ELECTRICAL DEPARTMENT.

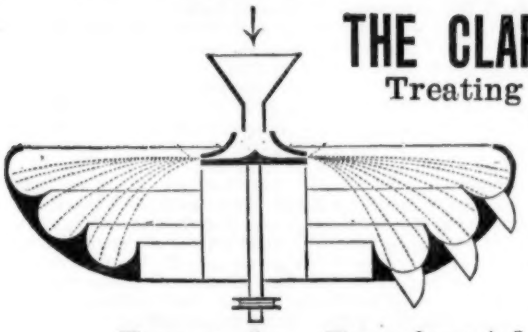
Gold Medal Awarded Mining Exhibition, 1890.

"THE ENGINEERING TELEGRAPH CODE USED."

MR. P. S. HAMILTON (late Chief Commissioner of Mines of the Province of Nova Scotia), PRACTICAL GEOLOGIST, MINING AGENT and MINING ENGINEER, HALIFAX, NOVA SCOTIA.
PURCHASES and SALES of MINING PROPERTY effected, with careful regard to the interests of clients.

Highest Award at the Mining Exhibition, 1890.

DRY CONCENTRATION.



THE CLARKSON-STANFIELD CONCENTRATOR (LIMITED), are successfully Treating the ores of Gold, Silver, Copper, Lead, Tin, Zinc, Cobalt, &c., &c. of all degrees of fineness, from 30 to the finest meshes by their **NEW MACHINERY** which may be seen in operation at

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Homogeneous substances, such as Emery, Glass, Sand, Sulphur, Black Lead, &c., graded according to size in one operation.

Terms for Experimental Concentration, and for Supply of Machines on Application.

NEW PATENTS.

LIST of APPLICATIONS for New Patents relating to Mining Metallurgical, Engineering, Railway and kindred matters, specially compiled from official sources for the "Mining Journal" by Messrs Rayner and Company, Patent Agents, 37, Chancery Lane, London, W.C., who will forward all information regarding them free on application.

6519 George Victor Priestly, Basinghall Street Chambers, Boar Lane, Leeds.—Improvements in steam generators.—April 2.
6539 Abraham Earnshaw and Tom Oldfield, 8, Quality Court, Chancery Lane, London.—Improvements in gas or other explosive engines.—April 2.
6577 Charles Scott Galloway, 46, Lincoln's Inn Fields, London.—Improvements in steam generators.—April 2.
6582 Charles Spratt, 24, Southampton Buildings, Chancery Lane, London.—Improvements in speed indicators.—April 2.
6585 Harry Thomas Bullmore and Henry John Herapath, 12, Tottenham Street, Tottenham Court Road, London.—Double lever gear.
6612 Thomas Woof, 56, Mall Road, Hammersmith, London.—Improvement in drilling machines.—April 3.
6630 Frederick Lister Croft, 2, Market Street, Bradford.—Improvement in or appertaining to friction clutches for transmitting rotary motion.—April 3.
6640 John Fenton, 37, Cursitor Street, London.—Improvements in means for ventilating underground workings.—April 3.
6647 Norman Eaton, 45, Southampton Buildings, London.—An improved combined steam and gas generator and engine.—April 3.
6679 Charles William Pinkney, 47, Lincoln's Inn Fields, London.—Improvements in or connected with gas producers or other furnaces.—April 3.
6697 James Ritchie, 87, St. Vincent Street, Glasgow.—Improvements in tubes for steam boilers.—April 4.
6710 Francis William Crossley and James Atkinson, Openshaw, Manchester.—Improvements in lubricators.—April 4.
6714 Robert Daniel Smillie, 154, St. Vincent Street, Glasgow.—Improvements in tubes for boilers.—April 4.
6744 Leon Benier, 47, Lincoln's Inn Fields, London.—Improvements in and connected with gas generators.—April 4.
6755 Percy Low, 28, Southampton Buildings, London.—Improvements in gas engines.—April 4.
6782 Angus Murray and Wallace Fairweather, 62, St. Vincent Street, Glasgow.—Improvements in steam distributing or controlling valves.—April 5.
6799 Evans Davies, 33, Chancery Lane, London.—Improvements in safety valves for steam boilers and other pressure containers.—April 5.
6822 Louis Bollmann, 93, II Obere Donaustrasse, Vienna.—Improvements in turbines driven by steam or gas.—April 6.
6847 James William Smallman, 61, Chancery Lane, London.—An improvement in the "Smallman" haulage clip.—April 6.

SPECIFICATIONS PUBLISHED.

2876, Kearney and others, drills, 1892; 7558, Webb, locomotive, &c., boilers, 1893; 2119, Cameron, steam, &c., pumping engines, 1893; 8749, Mumford, steam generators, 1893; 9618, Roots, internal combustion engines, 1893; 9778, Atterbury, ore pulverisers, &c., 1893; 17483, Thompson, percussion borers, 1893; 2756, Davies, miners' cages, 1893.

The above specifications published may be had of Messrs. Rayner and Company, 37, Chancery Lane, London, at 10d. each including postage.

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**** We shall be obliged by being promptly placed in possession of particulars regarding contracts open for competition, and of the results of successful tenders. In the latter case contract prices should be given.*

The date given is that by which tenders must be delivered, in nearly all cases further information can be obtained on application at the addresses given. In applying for such the name of "The Mining Journal" should be mentioned as the original source of the information, concerning which further particulars are required.

HOME CONTRACTS.

Sinking Pits (*Aberbeeg, Mon.*)—For the sinking of two pits near Aberbeeg, Monmouthshire, to the steam coal measures. For particulars apply to Messrs. John Lancaster and Co. (Limited), Blaina, Mon.

Sluice Valve, (*Manchester*).—For the supply of one 24-inch sluice valve for the Waterworks Committee. Plans and specifications on application to Mr. T. H. G Berrey, Waterworks office, Town Hall, Manchester.

Stores, (*Glasgow*).—For the supply of stores for one year from April 1, for the Pumpheraton Oil Company (Limited), 24, St. Vincent Place, Glasgow. Specifications and forms of tender on application at the office.

Driving Stone Drift, (*Acklington*).—For driving a stone drift 150 yards long. For full particulars apply to the Manager, Broomhill Colliery, Acklington.

Construction of Railway (*Madrid*).—The Secretary of State for Foreign Affairs has received from Her Majesty's Ambassador at Madrid, a copy of a royal decree, inviting tenders for the construction of a railway from Manila to Taal by Calamba and Batangas. The decree can be seen at the Foreign Office, S.W., on week-days between 11 and 6.

Aqueduct (*Birmingham*).—For the construction of about 10½ miles of the aqueduct, from Dolau to Knighton, in the county of Radnor, including the Dolau Tunnel 4¼ miles long, and the Knighton Tunnel 2¼ miles long, for the Corporation of Birmingham. The drawings may be seen and specifications and bills of quantities obtained at the office of the engineer, Mr. James Mansergh, 5, Victoria Street, Westminster, on deposit of cheque or bank-note for £10, which will be returned after the receipt of a *bona fide* tender, with the bills of quantities fully priced out.

Sinking Shaft (*Washington, Durham*).—For the sinking of a shaft 7 feet 6 inches in diameter, from a depth of 35 fathoms to the Hutton seam, 120 fathoms deep. Specification can be seen on application to Mr. Hornsby, manager, North Biddick Colliery, near Washington Station.

Railway Construction, May 15 (*Ellon, Aberdeen*).—For the construction of the Cruden Railway in Aberdeenshire, commencing at the Ellon Station on the company's Buchan line, and terminating at Boddan, which will be nearly 15¾ miles in length, for the Great North of Scotland Railway Company. An assistant engineer will be at Ellon Station at 10 a.m. on May 1, to accompany intending contractors over the ground. Plans, sections, and specifications to be seen on and after 24th inst. at the office of Mr. Patrick M. Barnett, C.E., Waterloo Station, Aberdeen.

Various Railway Stores. May 1 (*Tralee*).—For the supply of various stores for the engineers office for the Tralee and Dingle Railway Company, including sleepers, crossing timbers, shovels, picks, bracks, &c. Tenders to be received up to May 1. Particulars on application to Mr. S. A. E. Hickson, C.E., Denny Street, Tralee.

Railway Fittings May 2 (*London, E.C.*)—For the supply and delivery of steel underframes for carriages and wagons, colliery tubs, brass boiler tubes, miscellaneous tools and stores and panel plates for the East Indian Railway Company as per specifications and drawings to be seen at the company's offices. Tenders to be sent to Mr. A. P. Dunstan, secretary, Nicholas Lane, London, E.C.

Hydraulic Machinery May 1 (*Bolton*).—For hydraulic machinery for overhead railway siding, comprising engine, pumps, accumulator, tanks, and pipes. Particulars to be obtained on application to Mr. William Smith, gas engineer, Lum Street Works, Bolton. Designs, with tenders, under cover (endorsed "Tender for Hydraulic Machinery") to be sent to Mr. Alderman J. Miles, Chairman, Gas Offices, Bolton.

OUR INQUIRY COLUMN.

TO CORRESPONDENTS.

Correspondents will please take note that all communications will in future be answered in this column and not through the medium of the post. All questions and replies should be accompanied by the name and address of the writer.

REPLIES.

R. E. F.—Thanks for circular.

B. J.—We could not inform you without first seeing a specimen.

M. M.—The offices are at Broad Street House.

A. L.—We have never heard of the company.

G. W.—We are obliged for your suggestion, and as far as practicable shall endeavour to act upon it.

OLD READER.—The firm is both old established and reliable.

J. ST. G.—The prospects are so uncertain that we doubt very much whether two men on 'Change would take similar views.

H. A.—The company is in liquidation.

CONSTANT READER.—They are worthless.

X. Y. Z.—You could not wish for a better investment.

MINER.—Certainly not.

S. C.—The secretary will give you all the information you require.

M. P.—They are, we fear, too much out of date to be of value.

EXPLORER.—It is a sound investment, and we do not think you could invest your money more judiciously elsewhere.

H. S.—You have undoubtedly a good claim. We should advise you to prosecute.

ENGINEER.—Apply at Somerset House.

C.R.—We believe it a hopeful speculation.

R.L.—We cannot advise you to buy the shares you mention; the company is at the moment in a very precarious condition.

REX.—The article has been finally discontinued for some time now.

INQUIRER.—A committee of inquiry has been formed, and will report the result of their investigations to a future meeting, to be held the first week in May.

ANXIOUS.—We would rather withold advice in this matter, and would prefer you to act on your own responsibility, according to your judgment.

SHAREHOLDER.—The market for the shares is at the present moment dull, as are most gold mining shares.

SOCIETY OF ARTS.—At the sixteenth ordinary meeting, held on Wednesday, the 4th instant, Mr. Richard J. Middleton, F.I.Inst., Manager of *The Mining Journal*, was elected a Member of the Society for the Encouragement of Arts, Manufactures, and Commerce.

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GOLD MEDALS

AT ALL RECENT

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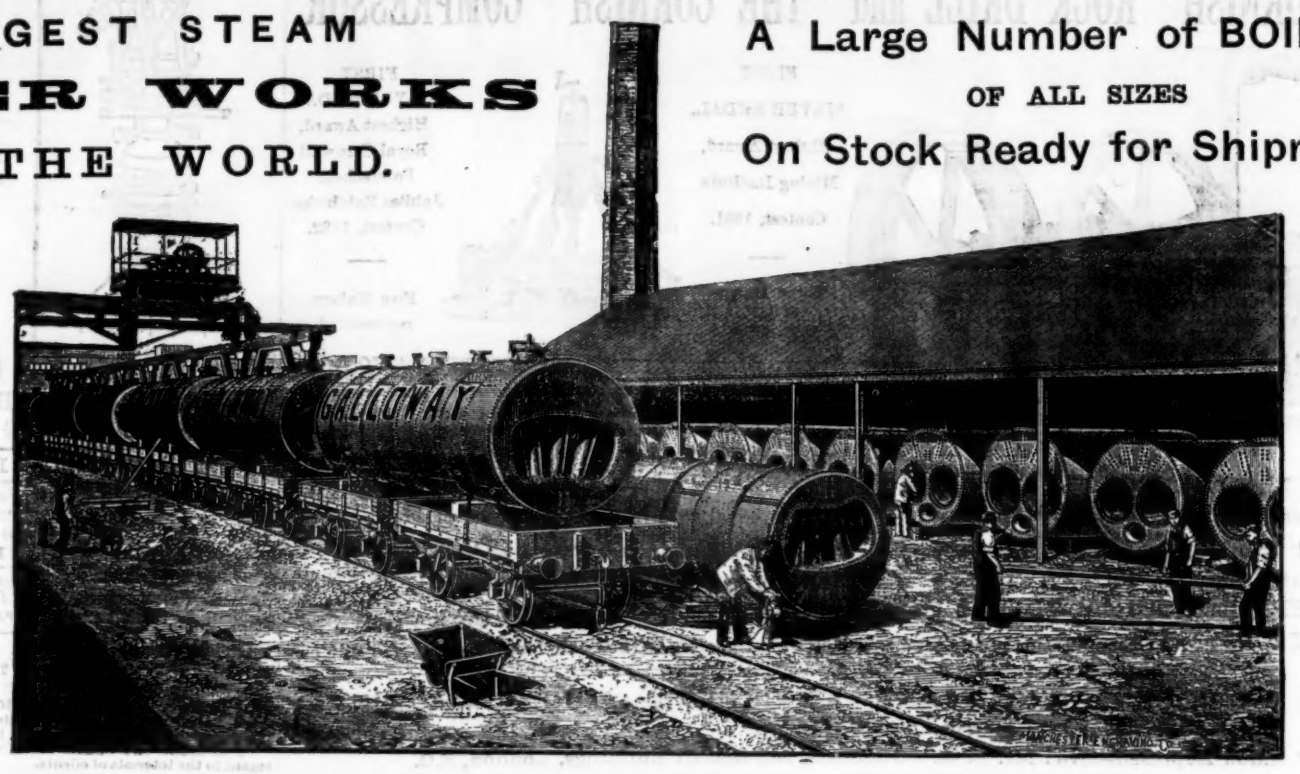

THE MURCHISON GOLD FIELD, WESTERN AUSTRALIA.

By ALBERT F. CALVERT, F.R.G.S.

EVEN as the radiance of the stars disappears in the presence of the noon-day sun, so have the tidings of Coolgardie's riches drawn away the attention of the public from the other gold fields of Western Australia. Sir Malcolm Fraser, Agent-General for the colony, has just received one of the most splendid golden trophies ever shipped to England. Forty-one bars weighing 6886 ounces, and 44 pieces of quartz, containing nearly 800 ounces more, were, on the 30th inst., on view at the establishment of Messrs. Spink and Son, of Gracechurch-street. Thus, right in the heart of the City of London, at the point the financial pulse of the world throbs most strongly, we have £35,000 worth of the purest gold, won from the desert of our most remote dependency. The metal is of light colour and of extraordinary purity, being valued at £4 per ounce. There have been accusations of apathy launched against the Western Australian Government. No doubt, perhaps, they had their own reasons for waiting. *Festina lente* is not the worst of adages. Fortunate Coolgardie! She has a grand future before her, and she has had a grand advertisement.

Coolgardie—as is generally known—is situated in the southern part of the eastern division of Western Australia, about 120 miles south-east of Southern Cross, and on the declared area known as Yilgarn—which is the aboriginal name for white quartz. It may, therefore, be regarded as almost the southernmost end (so far as at present laid bare) of the great parallel auriferous belt laid down by the well known mining geologist, John Calvert, in his remarkable work entitled "The Universal Distribution of the Metal Gold." Farther south, and outside the boundary of Yilgarn, are the Dundas Hills gold fields, which may yet surprise the world.

Passing out of the eastern division, and taking a course parallel with the coast line, which runs in a north-westerly direction, we find further corroboration of John Calvert's theory in the gold field known as "The Murchison."

This field is situated about 320 miles to the eastward of Geraldton, a seaport in Champion Bay. It takes about eight days of stiffish travel to get there from the sea coast. The road for the first 60 miles is decidedly bad, the first 30 being chiefly sandy hills, where water is scarce; and then comes a stretch of 30 miles almost completely destitute of water. The remaining 260 miles, however, lead through the bush, and present no great difficulty, water being obtainable at easy stages. The territory begins to exhibit its auriferous quality within about 80 miles of the diggings, and several belts are traversed which are well worth prospecting. As the practical miner approaches his destination, if it happens to be Murchison, his eye is more and more gladdened by indications of the metal kings. Quartz and ironstone in fragments strew the entire surface, and outcrops are visible in all directions.

The proclaimed area of the field is 32,000 square miles, and a glance at the latest Government map shows that it is about equal in size to Pilbarra and Yilgarn, only inferior in area to Kimberley, which has an area of 47,000 square miles. And, by the way, we would call attention to a curious anomaly which appears in the "Western Australian Year Book" for 1891, and which has actually been repeated in that for 1892-93. In both books we find these words (page 99 of the 1891 book; and page 198 of the year book for 1892-93):"—Yilgarn gold field proclaimed November, 1888. Area, 13,000 square miles." This is obviously a mistake, for the areas of Pilbarra, Murchison, and Yilgarn are laid down as nearly as possible equal on the most recent map, compiled by the Department of Lands and Survey at Perth. No doubt, 32,000 is the correct figure.

The principal auriferous belt is situated on the eastern side of the district, and runs in a north and south direction from West Mount Magnet to Austin's Lake; and then in an easterly direction from Lake Annean to Yagahong. Other rich patches exist further east, and a few rich spots have been discovered nearer the coast.

To Mr. John Connelly is accorded the honour of having shown the riches of this gold field to the world. He came upon it about three years ago, and it immediately became the object of an eager rush. Many leases were taken up at once, and expectations abundantly realised. The caps of the reefs were worked by the diggers, who were quite devoid of scientific appliances. They crushed the stone by hand, and did well. Such samples as were sent to Perth were as rich as anything yet won from the mine, and, on being broken, every fracture showed gold in all directions. The richest patches are undoubtedly local. This is always the case. But the mining expert of experience knows better than to trust to surface alluvial show. The words of Pope, in his "Essay on Man," may be applied to gold mining. He says:—

"A little learning is a dangerous thing;
Drink deep, or taste not the Pierian spring."

We venture to suggest that something of the same sort might be said about mining for gold. We would draw a parallel in this shape without daring to parody the wonderfully gifted poet. Surface mining—"alluvial digging" and "specking," as it is called in Australia, and "placer mining," as the Americans choose to term it—is like surface knowledge. One moment it shines and gives promise, the next moment it leaves nothing but the ashes of disappointment and discontent. When, however, we get down to the reefs—those strong hoary monuments of nature's childhood, those well-nigh eternal works of the Divine Achitect, where for countless cycles the gold has lain hidden—then surely we find something which will *last*, and the deeper we dig will be more revealed those wondrous veins of gold still impelling us to dig deeper, to try harder, and at length do better.

We will not quote matter which has been time after time in print regarding Murchison Fields. The Government geologist says in his report that they are the ruined remains of a vast, high, sandy table-land, presenting to-day a broken surface, consisting of salt marshes or lakes fringed by salt, sand, clay, gypsum flats, &c., from which rise low rough hills of metamorphic rocks or white cliffs, on the top of which are sandy plains, the remains of an old table-land.

We venture to add a word on our own account. We believe that Murchison has one advantage over her sister gold fields. And why? Because she seems to have all the elements of permanency. Listen to the opinions of men who have recently been there:—

Messrs. W. R. Wilson (of Melbourne) and T. H. Horn (of Adelaide), accompanied by a party of friends, recently returned home after an absence of some weeks, during which most of the mines on the Murchison field were examined. The party express themselves as being favourably impressed with the outlook generally, and say unhesitatingly that if the present outlook is maintained when another 100 feet of sinking has been done on the various reefs now being worked, the field may be regarded as a permanent one. The country is settled, and the walls are perfectly formed, while the stone so far treated shows much regularity in its value. Messrs. Wilson and Horn, who are large holders in the Day Dawn property, already so well known, have purchased Thompson and McCaw's lease, which is henceforth to be called the Trenton, and machinery for it will be sent forward at once. They have also secured the Rubicon leases. From the Trenton 55 tons have been crushed for 450 ounces by dollying and a Huntington mill, while the Rubicon has given a yield of 87 ounces for 30 tons, treated at the Day Dawn. The new 10-head of stamps are now running on the Day Dawn stone, and it is intended to add another 15-head the moment a supply of water is assured. The visitors enjoyed the trip up and down, and speak lightly of the difficulty of visiting the field. They say a railway in the near future is a certainty.

Let our readers glance at the opinion of an expert from South Australia. He expresses his firm belief in the permanence of the field and its prospects. He stated that the route from Geraldton to Murchison is a well-watered track of 270 miles, the longest stage being 16 miles, while there are wells 8 or 9 miles apart along the whole of the way; 70 miles of railway is to be constructed along the track by the end of March, the contractor having the right to run the railway for 10 to 12 months after completion. Cartage at present costs about £15 a ton, and the railway will mean a material reduction in this respect. Poles for telegraph lines are being delivered, about half the distance being already provided, and it has been stipulated that the line is to be put up in another 10 months, although the contractor is willing, provided he can make satisfactory arrangements with the Government, to get the work finished in about four months.

Mr. Horn says that water may be got in abundance by sinking from 50 to 100 feet at Four Mile, near Cue, which settlement is about 270 miles from Geraldton, whilst water is being got in the Day Dawn, Victory, and Trenton claims, along the Sailor Bill line of reef, at the Government Well, and at Butcher's Well. Supplies from the Government Well are at present being carried out daily to eight or ten miles for from 3d. to 6d. per gallon. Timber, that other great essential, does not, moreover, seem to be lacking. The supply of firewood, Mr. Horn said, will prove abundant for all purposes for a good number of years. He also produced some quartz specimens, which he asserted were quite equal in quality to those from the famous Bayley's Reward, though not quite equal to them in bulk.

And again we quote Mr. Joseph Bryant, of Ballaarat, who corroborates the views we have expressed, summed up in these words:—*Murchison is a lasting field.* Thus speaks our contemporary:—"The field is a most promising one; and he is very confident that it will attract great attention for years to come, and some of the places will develop into important and permanent mining centres. The great difficulties are undoubtedly want of water, mining timber, and fire-wood; but these will be overcome in time if the reefs are permanent, concerning which Mr. Bryant has no doubt. He does not think that the difficulties at the Murchison are greater than those the mining pioneers of Victoria had to face. A public battery was started only recently, and the charge of £3 per ton was £1 less than the Port Phillip Company charged the miners of Clunes years ago. Mr. Wilson, of the Day Dawn, informed him that 6 ounces to the ton would pay. The Yalga, Mount Magnet, The Island, and Cue gold fields in distance are something similar to the Creswick, Clunes, Talbot, and Maryborough fields of Victoria. The wells from Geraldton to Cue are well watered, from a West Australian point of view, but Mr. Bryant complains that they are not protected in any way or looked after by the Government. The wells were originally sunk by the squatters, and there is a continual soakage of water. In some of them there is between 12 and 15 feet of water. The wells are about 10 miles apart, and around each there is a large open space, all the trees having been cut down for fire-wood. Here, horses, camels, cattle, and human beings obtain their drinking water, and Mr. Bryant heard that the people frequently bathed in the wells. There is no protection, and the condition of the water can be imagined. Last summer 23 travellers were attacked with typhoid fever, the result of drinking this water, and as they could not receive any medical attention or medicine, 20 of them died, and were buried on the roadside. In March, 1893, the Warden stated that the area of the Murchison gold fields was 32,000 square miles. There is a great difference between leases and claims, the latter areas being worked under miners' rights, and there are labour covenants for each. For the last year, 713 miners' rights had been issued, 40 business licensed, and 81 gold mining leases. At the end of the year there were 130 of the latter, and only one had been surrendered. Altogether, about 1223 acres were held for mining purposes. On the return journey Mr. Bryant met, at Geraldton, Mr. N. M'Neil, the contractor for making the railway from Geraldton to Mullewa, which is expected to be open for traffic in three or four months' time. Cue is about 260 miles from Geraldton, and Mullewa is about 70 miles on the direct road. There is little doubt but that, although Mullewa will be the present terminus, it will not be long before it is further extended.

With these few words I dismiss the subject for the moment. The public have heard a good deal about Western Australia lately; and it is quite possible to have too much of a good thing. Coolgardie has already declared herself, and has drawn the attention of London to her mighty possibilities. I have thus delivered briefly myself regarding Murchison, and shall take early opportunity to speak of Pilbarra and other fields.

The Iron and Steel Institute.—The annual meeting of the institute will be held at the Institution of Civil Engineers, 25, Great George-street, London, on Wednesday and Thursday, the 2nd and 3rd days of May, commencing each day at 10.30 a.m. The Bessemer gold medal for 1894 will be presented to Mr. John Gjers; the President will deliver an address, and the following papers are expected to be read and discussed:—(1) "On the Physical Influence of Certain Elements upon Iron," by Professor A. O. Arnold; (2) "On the Analysis of Steel," by H. K. Bamber, F.I.C.; (3) "On the Capacity and Form of Blast Furnaces," by William Hawdon; (4) "On Scandinavia as a Source of Iron Ore Supply," by Jeremiah Head, M.Inst.C.E.; (5) "On the Application of Electricity as a Motive Power in the Iron and Steel Industries," by D. Selby-Bigge; (6) "On the Walrand Process," by G. J. Snelus, F.R.S., vice-president; (7) "On Methods of Preparing Surfaces of Iron and Steel for Microscopic Examination," by J. E. Stead, F.I.C.; (8) "On the Relations between the Chemical Constitution and Ultimate Strength of Steel," by W. R. Webster.

GOLD ORE TREATMENT AT THE RANDT.

An extra meeting of the London Section of the Society of Chemical Industry was held on Monday, the 16th inst., at the Chemical Society's Rooms, Burlington House, to hear a paper by Mr. H. De Mosenthal, F.I.C., F.C.S., on "The Treatment of Gold Ore at the Witwatersrand (Transvaal) Gold Fields."

The author prefaced his subject by saying that he was not himself a metallurgist, but that, having very recently returned from Witwatersrand, where he had been afforded the most ample facilities for seeing all the details of the processes of gold extraction, he would simply describe what he himself had seen. The paper was fully illustrated by diagrams, specimens, and some excellent lantern views of the various mines and works; it only dealt with the treatment of the ore after it had left the mine, not with the mining proper. The following is a brief abstract of the paper:—

The Witwatersrand Gold Fields are situated on one of the highest points of the South African plateau, some parts of the main reef being 5000 feet above sea level. It is worthy of note that on this account air compressors have to be made some 25 per cent. larger than they would need to be on the coast. Johannesburg, which is only about six years old, now contains some 30,000 white inhabitants, whilst the mines employ 21,000 native labourers. It is only the discovery of coal in close proximity to the gold fields that has made the present great development of these latter possible. The cost of transport of fuel is, however, still high owing largely to the refusal of the local railways to carry coal in bulk. It now costs about 22s. per ton delivered at the gold mines. It only yields a very inferior coke, so that this article has to be imported for assaying and smelting, imported English coke being worth about £14 per ton.

The ore is different from any known elsewhere; it consists of pebbles of quartz held together by a siliceous cement, which contains in the lower levels crystals of iron pyrites. At the surface the pyrites was oxidised and the ore was more friable, but the greater the depth attained the higher the percentage of pyrites appears to be. The gold is contained in the cementing material; it is so fine as to be scarcely ever visible to the eye, and much of it is combined with sulphides of the base metals, which latter are known as "sulphurets."

The ore when mined is hoisted up by means of head gears, which are seen dotted in all directions over the area covered by the gold fields. They are of two types. The first is a simple head-gear, which delivers the ore into trucks, which are then run into the mill-building where the ore is dumped on to a "grizzly" made of bars of iron, and then passes into a rock breaker, from which it falls broken small into a hopper to go to the stamp mill. As the country is very flat, and the mills are often some distance from the mines, it was found more economical not to have the rock-breaker in the mill building, but rather to place it on the head gear, and most modern head gears are so constructed. Rock-breakers are either of the well-known Blake or of the Gate's or Comet type. In these the ore is broken down to about 2 inches cube.

The mills are of the usual Californian pattern, with self-feeders. Their weight used to be 850 to 900 lbs., and they used to have a 9 inch drop. The most modern mills have 1200 lbs. stamps, and are worked with an 8 inch drop; some of these modern mills run as fast as 92 drops per minute. In consequence of having such powerful mills, the best are able to crush 4½ to 5 tons per 24 hours per head, through a 900 mesh screen. The average for the entire gold fields for the month of December last was 3·7 tons crushed per head per 24 hours.

The batteries have amalgamated copper plates inside them, and the crushed ore is discharged on to copper tables 12 feet long and 6 feet wide, these tables being amalgamated so as to catch the gold. It is found that most of the gold is caught inside the battery, and on the first 3 feet of the outside copper plates. The amount of gold caught on the plates is 55 to 60 per cent., an amount which compares unfavourably with many other plates where the percentage is said to be 80 to 90. The amalgam is collected, and is cleaned in pans, and then heated in retorts when the mercury is driven off and recondensed; the spongy gold so obtained is then melted. The loss of mercury in the entire treatment is about ¾ ounce per ton of ore; at the Robinson Mine it is 0·65 ounce. The melted gold is usually 800 to 825 fine. It contains silver, lead, copper, and other base metals.

After the pulp has passed over the plates it is run into concentrators, which extract the sulphurets. There are various kinds of concentrators used, but the Frue vanner is the most popular. The percentage of concentrates obtained is about 3, and these sulphurets assay from 5 to 8 ounces of gold to the ton. Most of the mines sell their concentrates to one of the two chlorination works on these gold fields, the price given being 90 per cent. of the assay value, less £4 per ton. In the chlorination process 95 per cent. of the gold contents of the ore is extracted. This process is, however, only suitable for rich material; it is not, like the cyanide process, suitable for poor grade stuff, such as are the tailings.

The concentrates are roasted in reverberatory furnaces, this being the most important part of the whole operation. The roasted stuff is then damped till it contains 6 per cent. of moisture, and charged into vats furnished with covers fitting gas-tight. Chlorine gas is then passed upwards through the roasted ore; this combines with the gold, forming soluble chloride of gold, which is then washed out, the solution being filtered off and the gold precipitated from the solution by means of sulphate of iron, which is made on the spot. The process is costly, owing to the high price of sulphuric acid, which costs £25 per ton. The consumption of acid is 300 to 400 tons per annum.

After the pulp leaves the concentrators it is run into dams where the tailings are allowed to settle. These tailings constitute about 60 per cent. of the ore, the remaining 40 per cent. forming the slimes which are run to waste, and are totally lost. The tailings contain 6 to 7 dwts. of gold to the ton, and the slimes 4 to 5 dwts. The tailings are discharged by hand into huge vats, the largest holding 400 tons. Then a solution of cyanide of potassium is allowed to flow through them. Some mines employ a system of repeated percolations of this solution, whilst others object to it. A strong and a weak solution are employed, the first containing from 0·6 to 0·3 per cent., and the second from 0·3 to 0·1 per cent. of cyanide. The whole tendency recently is to work with very weak solutions. Each solution is allowed to act from between 12 and 18 hours, and is then run off into zinc boxes where the gold is thrown down by means of zinc shavings. Theoretically 100 ounces of gold should be dissolved by 4·3 lbs. of cyanide, but in practice 300 lbs. of cyanide are required. Some mines consume as much as 2 lbs. of potassic cyanide for each ton of ore treated. The zinc precipitates the gold from the solution, forming a mass of so-called zinc residues, which contains a very great deal of zinc and other impurities. The zinc residues are calcined, and then melted with a mixture of carbonate of soda, borax, and fluorspar, when gold is obtained 720 to 750 fine, the principal impurity being lead. There appears to be no difficulty in refining this gold, which is very brittle. The average extraction of gold by the above processes in 1893 was 14 dwts. per ton, the assay value being about 15 dwts. 8 grains per ton.

THE METALLURGY OF LEAD.*

By J. B. HANNAY.

HAVING been engaged during the last seven years in the study of the treatment of lead ores, it became apparent very early in my work that the accepted explanations of the chemistry of lead smelting did not accord with the observed facts; so a systematic study of which have at length formed a complete explanation of the phenothe matter was entered upon, and notes gradually accumulated, mena observed; and I now venture to bring these results under the notice of the members of the Institute of Mining and Metallurgy. In order that the multitudinous facts may be classified, I have divided the work into the following sections.

1. The Relations of Lead and Sulphur.
2. Specific Gravity of Sulphide of Lead.
3. Methods of Analyses.
4. Furnace Reactions of Lead Compounds.
5. Lead Smelting.
6. New Metallurgy of Lead.

As Percy gave very minute attention to this subject, and epitomised our knowledge of the metallurgy of lead at the time of the publication of his work, and as very little seems to have been done subsequently, I take his volume on lead (1870 edition) as a guide in discussing the theories then held.

The present memoir is an attempt to elucidate this subject by an experimental investigation of the various reactions; and the discovery of some interesting compounds has enabled me to throw some light on the furnace reactions of lead.

As the smelting of lead sulphide is attained through the burning out of a portion of the sulphur, it was necessary, in the first place, to examine the "supposed sub-sulphides of lead," as Percy calls them. It was then found that when any compound of sulphur and lead with less sulphur than the mono-sulphide was fused, it was impossible to pour two samples of identical composition. When the melted "sub-sulphide" was allowed to cool slowly, and samples poured at intervals, there was great variation in the amount of sulphur—those samples poured at the lowest temperatures containing the smallest proportion. It then became clear that the reticence and indefiniteness of the standard works on the subject of the lower sulphides of lead arose from the fact that no such sub-sulphides exist; but that all sulphur compounds containing less than the theoretical amount of sulphur required to form PbS, are mixtures of the mono-sulphide and metallic lead.

As all fireclay and plumbago crucibles absorb the melted galena and its products of oxidation, the final experiments were conducted in porcelain crucibles, placed as a lining inside thin "salamander" plumbago crucibles.

After many experiments it was found that any compound of lead and sulphur may be fractionated (by allowing a portion to crystallise, and pouring off the still fluid portion) into the two extremes—viz., metallic lead and its mono-sulphide, and by starting with a compound containing sulphur and lead in the proportion to form a hemi-sulphide (Pb_2S), the separation of the mixture into its extreme terms was accomplished.

To this end it was necessary to obtain in the crucible, in a molten state, a mixture containing 7·17 per cent. of sulphur. 100 grammes of a mixture of sulphide of lead and lead which contained 7·43 per cent. of sulphur was melted and poured without fractionation, and on analysis was found to contain 7·22 per cent. of sulphur, having lost 0·21 per cent. Taking this as a guide, 500 grammes of a mixture analysing 7·38 per cent., and which should yield on fusion a compound of 7·17 per cent., was melted, allowed to partially crystallise, and parted as equally as could be judged, and yielded:—

253 grms. containing 8·29 per cent. of sulphur
and 240 " " 5·79 " " "

Higher portion 253 grms. yielded:	Lower portion 240 grms. yielded:
162 containing 7·14 p. cent. sulph.	135 containing 6·84 p. cent. sulph.
87 " 9·62 " "	98 " 4·20 " "
Higher portion 87 grms. yielded:	Lower portion 98 grms. yielded:
50 containing 8·21 p. cent. sulph.	55 containing 5·27 p. cent. sulph.
35 " 10·31 " "	39 " 1·84 " "
Higher portion 35 grms. yielded:	Lower portion 39 grms. yielded:
25 containing 9·36 p. cent. sulph.	8 containing 8·10 p. cent. sulph.
7 " 12·27 " "	28 " 0·00 " "
Highest, 12·27 p. cent. of sulphur.	Lowest, metallic lead.

From the above we see that it is possible to fractionate a compound of lead containing less sulphur than the monosulphide into its two ultimate products, lead, and its mono-sulphide, because, although the highest proportion of sulphur obtained was 12·27 per cent., it is impossible to melt mono-sulphide (except under extreme precautions, which in this preliminary stage of the enquiry were not used) without volatilising or burning off about 1 per cent. of the sulphur, so that the above 12·27 per cent. compound really represents the mono-sulphide. It is apparent from this experiment that in the liquid state the compounds Pb_2S and Pb_4S have no existence, but it remained to determine whether or not all compounds of lead containing less sulphur than the mono-sulphide are mixtures of that body with metallic lead, or whether there exists an infinite series of sulphides of lead—the metal arriving at saturation on the proportions of the mono-sulphide being reached. An interesting experiment showing the above fractionation, but conducted by a single experiment, may be performed as follows: A mixture with about 5 or 6 per cent. of sulphur is melted at a bright red heat, removed from the furnace, but kept from cooling too quickly, while the contents of the crucible are made to assume a rapid centrifugal motion by a movement of the arm. By this means the sulphide, as it comes ripe for crystallisation, is caused to adhere to the sides of the crucible, and the lower sulphide compounds remain liquid. If the centrifugal motion is kept up sufficiently violently, high sulphides are separated out as soon as formed, and the central liquid portion is thus gradually robbed of its sulphur, and finally metallic lead is left. For instance, 100 grms. of a 5·5 per cent. compound yielded in this way 50 grms. of hard lead containing only about 0·05 per cent. of sulphur. This was re-melted, and yielded by a similar centrifugal treatment 20 grms. of pure soft lead, leaving 30 grammes of hard lead and dross. This, again treated, yielded 17·5 grammes of soft lead and 12·5 of hard lead and dross which was not further dealt with. 100 grammes of a mixture containing 8·7 per cent. of sulphur when fractionated with as violent centrifugal motion as the hand could give yielded only a few drops of hard lead weighing 8·5 grammes containing 0·88 per cent. of sulphur.

So rapid is this separation into higher and lower sulphur compounds, that it is impossible to pour a portion into the hemispherical cavity of an assay mould without separations taking place of such an extensive nature as to render any analysis of the sample utterly untrustworthy, unless the whole sample is pulverised and intimately mixed before analysis. Below is a diagram representing a section of the button of an 8 per cent. compound poured into an assay mould.

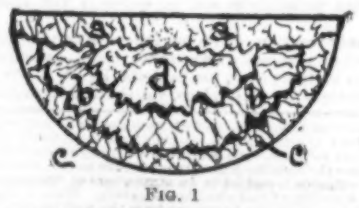

FIG. 1

A = 25 per cent. of whole contained 9·5 per cent. sulphur.
B = 30 " " " " 9·0 " "
C = 20 " " " " 8·0 " "
D = 25 " " " " 4·5 " "

* Paper read before the Institute of Mining and Metallurgy on Wednesday last.

2. Specific Gravity of Lead Sulphide.

When galena is melted in air, a portion of the sulphur is burnt off, but it was found quite easy to prevent this by melting the galena with some sulphur, while covered over with charcoal.

Artificial galena was found to be identical with the natural mineral, but the specific gravity of both varieties varied in an unaccountable manner until it was discovered that it is impossible to bring pulverised galena into contact with water, much less to boil it (as in specific gravity determinations), without oxidation taking place. The oxidation lowers the specific gravity. When the determinations were conducted in benzine all irregularities disappeared, and the specific gravity of pure galena, whether natural or artificial, was found to be 7·766. Mere warming of the pulverised galena in the water bath to drive off benzine caused oxidisation sufficient to lower the specific gravity by 0·05 each time.

In order to determine, by specific gravity determinations, whether or not any combinations (however weak) existed between PbS and the Pb in the lower sulphurised mixtures, a series of hypothetical compounds Pb_2S_3, Pb_3S_4, Pb_2S, Pb_3S, and Pb_4S were prepared by melting the necessary amount of pure lead and galena, then violently agitating and pouring the mixture into a cold steel mortar. Although so suddenly chilled, it was found that considerable separation had taken place, the layers in the crucible varying in composition. The samples were reduced to powder, and their specific gravities determined in benzine.

I have tabulated the figures obtained along with calculated results. In calculating these specific gravities, Deville's value for lead (11·254) was used:—

	Per cent. Sulphur. Obtained	Per cent. Sulphur. Calculated.		Specific gravity. Obtained in benzine.	Specific gravity. Obtained in water.	Specific gravity. Calculated.
PbS	13·40	13·415	...	7·766	7·585	—
Pb_4S_3	10·32	10·41	...	8·35	8·05	8·364
Pb_3S_2	9·29	9·362	...	8·55	8·32	8·568
Pb_2S	7·18	7·191	...	9·05	8·786	9·071
Pb_3S	4·89	4·911	...	9·64	9·42	9·652
Pb_4S	3·71	3·729	...	9·98	9·72	10·005

The numbers representing the specific gravities, as obtained in water, are the means of a large number of determinations, as I had repeated the operation again and again, owing to the discordant results, before I tried the benzine method. I then obtained constant results. These results show that the supposed subsulphides are simply mixtures of the mono-sulphide with metallic lead.

3. Methods of Analysis.

An examination of the methods of analysis was made in order to find an accurate and speedy method of estimating both the lead and sulphur in the same weighed portion.

A method of oxidation was sought which would speedily yield a pure sulphate of lead from the sulphide, and the following was found to be successful, and to prevent the separation of sulphur.

Strong nitric acid is gently warmed in a beaker, and a few crystals of $KClO_3$ added, and the whole covered with a glass plate. When the liquid has become dark yellow by the decomposition of the chlorine, the pulverised galena is thrown in, and the beaker maintained at a temperature of about 50 degrees. Additional crystals of chlorate are added from time to time, and the contents agitated.

If the temperature be allowed to rise too high, the oxides of chlorine are apt to explode, and, on the other hand, if the chlorate becomes exhausted before the galena is oxidised, the nitric acid will give off red fumes, and set free sulphur.

By occasionally dropping in an additional crystal of chlorate this is avoided, and a beautiful white sulphate of lead formed.

It was found that when the sulphur was precipitated as sulphate of barium in presence of lead, the precipitate always contained lead, from which it was impossible to free it, while some of the barium sulphate was retained in solution by the lead salt, and so passed into the filtrate. After a few hours it gradually precipitated along with some lead.

It was also found that when it was attempted to convert the sulphate of lead into carbonate by boiling with a solution of alkaline carbonate, a portion of the lead was soluble in the alkaline solution, and so passed into the filtrate along with the sulphates of the alkali metals, so that in neither case was there complete separation of the lead and sulphur. The following process was finally devised, and was found to yield reliable results for determining both lead and sulphur in the same sample.

The galena or subsulphide of lead was oxidised by the chlorate mixture already described, using 10 c.c. of strong nitric acid to 1 gramme of galena, the mixture evaporated to dryness, and 2 grammes of pure sodium carbonate added with some water. The mixture was boiled for a few minutes to convert the whole of the lead into carbonate and then cooled, 2 grammes of sodium bicarbonate added, and the mixture allowed to digest in the cold for about a quarter of an hour.

It was found by this method that the lead which had become dissolved by the carbonate of sodium was thrown down by the addition of the bicarbonate, so that, on filtering, the whole sulphur passed through as sulphate of soda, while the lead remained behind on the filter as carbonate, and was weighed as sulphate. Care was taken that the amount of water used in this digestion was insufficient to dissolve all the sodium bicarbonate, so that on washing the lead on the filter with cold distilled water, the sodium bicarbonate was gradually dissolved away.

By these means the complete separation of sulphur and lead can be effected.

The carbonate of lead on the filter is dissolved in dilute nitric acid and precipitated as sulphate, while the sulphur is estimated as $BaSO_4$ in the ordinary way.

Most of the analyses given in this paper were done by this method. A method that was sometimes used when the proportions of lead and sulphur approached that of galena was that given by Thorpe in his Handbook of Analyses, which consists of suspending the sulphide of lead, very finely pulverised, in caustic soda solution, and oxidising it by a stream of chlorine gas. The lead is converted into the di-oxide, and may be heated in a porcelain crucible and weighed as litharge, while the sulphur passes into the filtrate from the lead as sulphate of soda.

This method of separation was found to be very accurate for galena, but as it involved the use of chlorine gas, and was inapplicable to lead containing little sulphur, it was found preferable to make use of the method I have already detailed.

4. Furnace Reactions of Lead Compounds.

We have seen that the text-book information on the sulphides of lead, their specific gravities and analyses was lamentably faulty; but it is when we come to deal with the reactions of lead compounds at high temperatures that we see how little is known about the chemistry of the furnace reactions of lead.

Percy says that the chemistry of lead smelting is unexplained. He gives in his book various reactions which will now be examined *seriatim*. For instance, $PbS + PbSO_4 = Pb_2 + 2SO_2$ is given as the whole *rationale* of lead smelting. It is supposed that the slow oxidation of the ore in the furnace in the earlier stages of smelting produces sulphate of lead, and that this, reacting on the unaltered sulphide, produces lead, as by the reaction. That reaction being the sheet anchor of the accepted explanations of lead smelting was one which it seemed necessary to subject to a searching examination.

In performing these and subsequent experiments, it was found that where litharge is formed it is impossible to obtain accurate results if the mixture is allowed to come into contact with the plumbago, as a portion is at once reduced to metallic lead, so these reactions were performed in thin salamander crucibles, inside of which were placed porcelain capsules of the requisite size. This was necessary for another reason. The lead compounds adhere so firmly to all crucibles that it is impossible to remove the contents from the crucible, so it was convenient to remove the capsule and weigh it with its contents.

In most cases, the contents were poured into an iron mould so as to be ready for analysis, and the capsule weighed with what adhered to it,

The sulphide of lead used had about 1 per cent. of impurity, so in the first experiment 120 grams of PbS were intimately mixed with 151 grammes of $PbSO_4$—*i.e.*, in the proportions of half of Mol. wts. This was fused in the porcelain capsule inside a salamander crucible in a Fletcher's gas furnace, and on pouring it was noticed that instead of lead there appeared to be about equal quantities of lead and litharge. The litharge was of a dark greyish colour. The residue weighed 188·4 grams instead of 206·4, as it should have done, had the reaction gone as by the above equation.

As a considerable amount of fume had been evolved I thought that perhaps the air had something to do with the non-success; so although the fusion had been done in a well-covered crucible, it was determined to repeat it in nitrogen. This was done by grinding a small plumbago crucible to fit in as a dome to the larger one, and passing a carbon tube through a hole in the top of the dome, and passing a slow current of pure nitrogen. The same proportions were used as before, and this time the residue weighed only 185 grams, showing a loss of nearly 32 per cent., instead of 23·7 per cent. Again it was noticed that a considerable quantity of lead fume was given off. An experiment was done with a smaller quantity, using only one-tenth part of the above weights—viz., 12 PbS and 15·1 $PbSO_4$, which gave a residue of 18·7 grams, so that the reaction seemed quite constant and independent of the mass used. The proportions of lead to the dark coloured litharge were as 86 to 93.

In order to see what was going on, the sulphide of lead was melted in the porcelain capsule in an atmosphere of nitrogen, and the sulphate added in little pieces and rough powder, momentarily removing the cover for each addition of sulphate.

Twelve grams of sulphide were melted and the sulphate gradually added. It was seen that on each addition of sulphate there was a very violent evolution of sulphurous acid, and a considerable amount of some lead compound accompanied it, and in this case the residue weighed 17·8 grammes, so that there seemed to be a greater loss by adding the sulphate gradually than when the two were mixed before fusion. A repetition of the experiment yielded precisely the same results.

It was evident that there was a very considerable volatilisation of some lead compound formed in the reaction, and an attempt was made to condense the body in the following manner:—

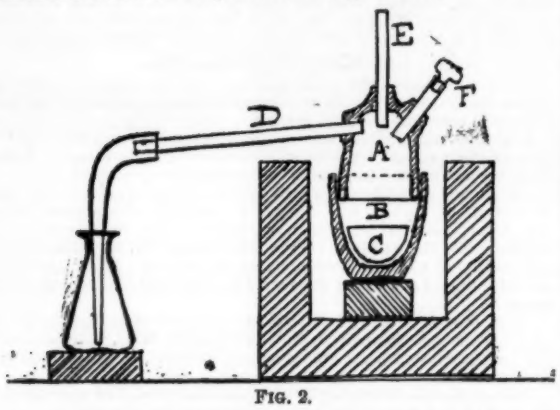

Fig. 2.

A crucible A, was ground to fit another crucible B, while a porcelain capsule C was placed in the bottom of B. A hard glass tube D was fitted in with asbestos to serve as an exit for the gases, while the carbon tube E served for the admission of nitrogen. A porcelain tube closed by a stopper F was provided, to allow of adding the sulphate after the sulphide had been melted. A tube was adapted to the end of D and the point made to dip into caustic soda solution. The joints were made with silicate of soda; 24 grams weight of PbS was placed in the capsule C, and the apparatus made up as air tight as possible, a slow current of nitrogen passed. The temperature was raised to a very bright red heat, and the $PbSO_4$ to the extent of 30 grams sufficient for the equation $PbS + PbSO_4 = 2\ Pb + 2\ SO_2$ added through the tube F, closing it at once after each addition; 54 grams were used and the residue weighed 36 grams.

It was early seen that the volatile lead compound, most of which condensed in the tube D was black, and on examining the tube when the reaction was complete it was found, when viewed under the microscope, to consist of minute cubes of sulphide of lead. Of this there was collected from the tube and receiver 5·5 grams, and the caustic soda solution, on oxidation by passage of chlorine, yielded $BaSO_4$ equal to 10 grammes SO_2.

It was plain from the beautifully regular crystalline form of the PbS, that it had been condensed from a state of vapour, so it became a question of whether the reaction had caused a special volatilisation of the sulphide of lead, or whether it simply represented the ordinary volatility of the sulphide of lead

For this purpose an apparatus was fitted up as at Fig. 2., but the tube E was made to dip to the bottom of C, and the tube F was dispensed with.

A quantity of sulphide of lead was melted in C, and nitrogen passed rapidly, so that the liquid sulphide was splashed about.

No trace of fume was formed, and the tube D was not even stained. By looking down obliquely through the hard glass tube D, which was only slightly softened by the heat, the molten sulphide could be clearly seen in a state of violent agitation, yet no fume was formed. On mixing even as little as 1 per cent. of air with the nitrogen, fumes rose and blackened the tube D, so that it appeared that the volatility was in some way due to oxygen.

The experiment was repeated with hydrogen with the same result, but the fact was noted that if hydrogen was passed from the time the crucible was cold, no fume resulted; whereas when the hydrogen was only applied after the sulphide had been fused, a rush of sublimate came off at first and then ceased. Even at a white heat no sulphide sublimed when pure hydrogen or nitrogen was bubbled through the liquid sulphide, but the smallest proportion of oxygen or water vapour immediately caused sublimation. The same was true with ammonia vapour, and the experiment formed a very delicate test of the dryness and purity of the gases.

The rush of sublimate on passing hydrogen after fusion was found to be due to the formation of water by the hydrogen reducing some litharge which had been formed during fusion.

On passing sulphur dioxide very copious emission of fumes took place, and the sublimate condensed to a gray powder with a silky lustre, which was due to its being composed of cubes. Steam also gave copious evolution of sulphide, and in this case the crystals were very much smaller. Carbon dioxide also caused the volatilisation of the sulphide, as also did carbon monoxide.

The cause of the fume given off by galena when heated in air now became apparent. A portion of the sulphur is burnt to sulphur dioxide, which combines with a molecule of lead sulphide, and carries it off. This was tested in the following manner:—Air was passed slowly through 50 grams of molten sulphide in the apparatus Fig. 2, and the fume, which was composed of cubes of PbS, was condensed as well as possible, and the SO_2 absorbed by caustic soda.

Air was passed for some time after the emission of fumes had ceased, and the metallic lead remaining, which was very fine and soft, was poured. It weighed 18·5 grammes, and the crucible contained 4·35 grammes of lead oxide, while 21 grammes weight of PbS sublimate was collected, and 7 grammes weight of SO_2 was found in the caustic liquor. This clearly proves that every molecule of sulphur dioxide takes up a molecule of lead sulphide, and forms the volatile substance PbS_2O_2, which, however, only exists at a red heat, and on cooling splits up into its constituents. The lead and litharge formed by the passage of the air after all the sulphur had been oxidised amount together to exactly one-half of the lead in the sulphide used, so that the other half was carried away as vapour. I should state that a portion of the sulphide always condensed in the upper part of the dome, and did not pass into the tube D, so that the yield always seems a little low.

The temperature was raised to white heat and the air passed more rapidly, when practically the same result was obtained.

Lastly, the experiment was repeated at a white heat in a rapid current of pure oxygen, when there resulted 22 grammes of pure soft lead, 4·5 grammes of PbO, and 5·5 grammes of SO_2. The sublimate which had been oxidised to sulphate of lead was not collected.

From these facts it appears that the reaction is independent of temperature, and may be represented thus:—$2\ PbS + O_2 = Pb$ PbS_2O_2 ($PbS.SO_2$), and the other gaseous oxides, CO_2, CO, H_2O, seem to form volatile double compounds with PbS.

I may here mention that, reasoning from the behaviour of other compounds formed from a solid and a gas, it was expected that by heating liquid sulphur dioxide with finely pulverised sulphide or lead in sealed tubes under pressure, the volatile compound PbS_2O_2 would be formed. But lead seems always to act in the most unexpected way. On heating sulphide of lead with liquefied sulphur dioxide to a temperature of 130 degrees C, just under the critical point, no action seemed to have taken place; but on cooling down to about 45 degrees C beautiful needles separated out and crystallised, sometimes stretching across the tube about ½ in bore. It was attempted to increase the amount of this substance by prolonged heating, but after 4 hours little more seemed to be formed.

Thinking that the crystals might arise from a trace of moisture in the tube, means were taken to insure perfect freedom from moisture; but still the crystals appeared, and in the same small quantity, the remaining sulphide appearing to be unacted upon. Stronger tubes were filled, and the temperature raised to 350 degrees C. It was seen that after an hour's heating the gas in the tube was dark brown, so it was thought that the volatile compound had been formed, but on cooling, yellow drops of sulphur separated, which finally solidified, and the crystals again appeared in the liquid.

The crystals turned out to be prismatic sulphur, and the brown gas sulphur vapour, so that no volatile lead compound had been formed, but the reaction had been $4\ PbS + SO_2 = 2(PbS\ PbO) + S_2$.

It is characteristic of the unexpected manner in which lead compounds act that the reverse of this action—*i.e.*, $4\ PbO + S_2 = (PbS\ PbO)_2 + SO_2$, does not take place when sulphur is heated with PbO and SO_2 in a sealed tube. When sulphur is added to molten PbO, the oxysulphide compound is at once formed, the above reaction taking place, yet the PbO is absolutely unchanged by the action of sulphur dissolved in liquid SO_2 even when heated up to 300 degrees C.

On passing pure nitrogen as before, and no fume being given off, a small quantity of CO_2 was introduced into the nitrogen, when fumes at once arose. The same occurred with carbonic oxide and water vapour.

The fact that the compound only exists at a high temperature and is decomposed on cooling is so singular, and, in fact, exactly the opposite of what usually occurs with compounds of a solid and a gas, which usually dissociate at high temperatures—a few experiments were performed to learn something of its nature.

The tube D, in Fig. 1, was turned slightly up and placed in a tube furnace, and SO_2 passed through molten galena in C. The gas PbS_2O_2 came off freely and passed along through the combustion tubing D. It was seen that when the tube was raised to such a temperature that the hard glass was softened, the gas passed without depositing any PbS, and seemed to be a colourless gas, but whenever the temperature was allowed to fall just below the melting point of hard glass, PbS begins to be deposited.

It is easy to distil all the lead sulphide over from one vessel to another by means of either of these gases, but the most rapid evolution of fumes, although resulting in the separation of some metallic lead, is caused by passing the vapour of sulphuric acid into the sulphide, or by dropping the acid on the surface of the molten sulphide, when it is decomposed according to the equation $2H_2SO_4 + PbS = 3SO_2 + 2H_2O + Pb$, and, as each molecule of these gases takes up a molecule of PbS, the reaction stands,

$$2H_2SO_4 + 6PbS = 3\ (PbS.SO_2) + 2(PbS.H_2O) + Pb.$$

These gases being in contact with the sulphide while in the nascent state take up the full quantity of PbS, and so 2 molecules of H_2SO_4 carry away 5 molecules of PbS.

On passing the $Pb\ S_2O_2$ compound over molten PbO the compound is decomposed, and the PbS combines with the PbO, forming the compound (PbS.PbO), setting the SO_2 free, and forming the lead member of this new group of compounds.

This substance PbS.PbO plays an important part in the metallurgy of lead, as we will see subsequently.

Nascent sulphur dioxide acts much more perfectly in forming PbS_2O_2 than free gas passed from an extraneous source; but as the temperature approaches white heat, and, by passing the gas slowly, a result can be obtained agreeing closely with the formula PbS_2O—*i.e.*, every molecule of SO_2 combines with one of PbS. But little or no PbS is taken up by free SO_2, when passed over solid PbS at a dull red heat, but when air or oxygen is used, the SO_2 produced by the burning out of sulphur in the PbS being in contact with PbS in its nascent state, produces the compound, and a considerable evolution of fumes is the result. The discovery of this volatile lead compound affords the key to much that was formerly very puzzling as regards the behaviour of lead compounds. It shows how a substance which is practically fixed at a white heat in neutral gases, yet gives off copious fumes at a moderately low temperature in air, and it affords a very complete explanation of the extreme difficulty of condensing lead fume.* I have spoken of the sublimate condensing in beautiful cubes, but this only takes place when concentrated and unmixed with a large volume of furnace gas. On the contrary, when the fumes are allowed to escape direct from the crucible into the hot gases rising from the gas furnace, they rise 4 or 6 feet without showing more than a slight blue haze. Meanwhile, the PbS is becoming partially oxidised, and losing its power of crystallising in the cubic or any other system. When it passes into the air, far enough from the furnace to become cooled, it has become so thoroughly mixed with other gases that it becomes visible as a grey haze of the very finest tenuity, which is the constant characteristic of lead fume, so that flues or tunnels even a mile long do not suffice for its condensation.

Having determined the source of loss in the experiments on page 3, we are now in a position to formulate what occurs when sulphide of lead reacts with sulphate, and also with oxide.

Amongst all the formulæ given in chemical works, and especially collected in Percy's Metallurgy on the furnace reactions of these compounds of lead, there is not one which really expresses the truth. The main cause of this failure to arrive at any true explanation of lead reactions lies in the fact that the existence of the volatile compound was hitherto unknown. This is rather curious, inasmuch as the fuming of lead has been observed and unexplained from time immemorial. Percy, who devoted some years to the subject of lead, gives a number of formulæ for reactions, and says, "Much skill is required to yield even approximate results." No amount of skill could ever yield accurate results when a large part of the acting substance is going up the chimney. Percy ultimately says that the chemistry of lead smelting is still unexplained. But even where volatility is not in question the real truth was not known.

The only reaction given by Percy which is practically correct misses out an extremely important point. In acting upon sulphate of lead by metallic lead, the formula $PbSO_4 + Pb = 2PbO + SO_2$ is practically what takes place, yet there is a minor reaction going on simultaneously—viz., $PbSO_4 + 4Pb = 4\ PbO + PbS$, and this formation of sulphide of lead renders the litharge obtained by this reaction of little use in most commercial manufactures.

But to return to what I have named the "Sheet Anchor" of the old theory of smelting. We have seen that $PbSO_4 + PbS = 2Pb + 2SO_2$ does not take place, but that something much more complex occurs. As a certain portion of the added re-agent is being thrown out of action by volatilisation, and as changes in the reaction are caused by the products gradually accumulating in the residue and taking part in the reaction, the addition of $PbSO_4$ to PbS, or *vice versa*, goes through a series of steps which also vary a good deal with temperature. During the seven years in which I have been engaged on this subject, I have traced all these reactions by hundreds of experiments, and as the results clearly establish the course of reaction, but are too voluminous to quote *in extenso*, I will explain the reactions and merely quote these experiments, which are required to prove at certain stages what is going on. Some of these experiments have been done on large quantities of several hundred-weights, and others on small quantities in the laboratory; but all have been repeated many times.

When sulphide of lead is melted in large quantity, and a small quantity of sulphate of lead added at a high temperature, the addition being made gradually, the following reaction takes place. The dark-faced formulæ indicate the volatile portion:—

(1.) $12PbS + PbSO_4 = \mathbf{2PbS_2O_2} + 2Pb + 9PbS.$

It is impossible to obtain this reaction rigidly true, as minute portions of the sulphate react with the lead set free before it has time to be absorbed in the remaining sulphide, and so litharge is produced, which reacts on the sulphide and introduces complications. Were it not for these complications, the reaction would proceed just as by the air oxidation of the sulphide—*i.e.*, one half of the lead would be driven off as PbS_2O_2, and one half reduced to the metallic state, thus:—

(2.) $3PbS + PbSO_4 = \mathbf{2PbS_2O_2} + 2Pb.$

So that as PbS_2O_2 has the same molecular weight as $PbSO_4$, there would be exactly double the weight volatilised which was added.

Let us see what actually takes place.

24 grammes of PbS were melted and 2·5 grammes of $PbSO_4$ added, the residue weighed 22·1 grammes, and 1 gramme of SO_2 was condensed. By reaction (1) there should have been 21·4 grammes of residue and 1·07 grammes of SO_2 given off.

On analysis of the remaining sulphide, the ratio of lead to sulphur was as 11 to 9, as required by theory. On adding $PbSO_4$ to melted PbS, in molecular proportions, for the reaction on page 1, which is supposed to represent what goes on in the furnace in lead smelting, we actually get, when the temperature is just sufficient to keep the sulphide liquid:—

(3.) $12PbS + 12PbSO_4 = \mathbf{4PbS_2O_2} + 12Pb + 8PbO + 16SO_2.$

24 grammes PbS and 30·2 grammes $PbSO_4$ gave a loss of 18·0 grammes, containing 8·6 grammes SO_2, while the residue consisted of 18 grammes Pb and 17 of PbO.

The theoretical numbers are:—Total loss, 18·6 grammes, SO_2 8·6; lead, 20·6; and PbO 14·8. It will be seen that some oxygen came from the air and oxidised some of the Pb and PbO, otherwise the reaction is correctly expressed. At a higher temperature when nearly approaching a white heat, the reaction gave more of the volatile compound, and assumed the form:—

(4.) $12PbS + 12PbSO_4 = \mathbf{6PbS_2O_2} + 12Pb + 6PbSO_4 + \mathbf{6SO_2}.$

If the capsule is at once removed from the furnace when the last of the $PbSO_4$ has been added, the metallic lead nearly equals the amount required by the equation (4); but the Pb reacts on the $PbSO_4$, giving litharge and sulphur dioxide, and the delay in getting the crucible out of the heat usually allows the secondary reaction to proceed to some extent. Thus, in one case, 3 molecules of lead had reacted, and at the moment of pouring it stood:—

(5.) $12PbS + 12PbSO_4 = \mathbf{6PbS_2O_2} + 9Pb + 6PbO + 3PbSO_4 + \mathbf{9SO_2}.$

24 grammes PbS and 30 grammes $PbSO_4$ (in all 54 grammes) gave 36 grammes residue containing 20PbO and $PbSO_4$, which on analysis gave 8 grammes of $PbSO_4$, leaving 12 grammes PbO, and there were 16 grammes of lead.

The amounts required by theory would be a residue of 34·1 containing 11·1 grammes PbO, 7·5 grammes $PbSO_4$, and 15·5 grammes Pb. At these high temperatures it is difficult to prevent some oxidation by the air, but these numbers agree very closely with the formula.

Another experiment which was carried on till all evolution of SO_2 ceased, when the reaction by complete interaction of the Pb and $PbSO_4$ gave:—

(6.) $12PbS + 12PbSO_4 = \mathbf{6PbS_2O_2} + 6Pb + 12PbO + \mathbf{12SO_2}$;
or, $2\ PbS + 2PbSO_4 = \mathbf{PbS_2O_2} + Pb + 2PbO + \mathbf{2SO_2}$.

24 grammes PbS and 30 grammes $PbSO_4$ gave 33.4 residue, containing 10 grammes Pb, and the residue consisted of PbO with a little PbS, which always forms in this reaction. Theory require 32·5 of residue containing 10·3Pb and 22.2PbO.

When we reverse the reaction and act upon molten $PbSO_4$ by increasing quantities of PbS, we obtain a different set of reactions.

On adding 1 molecule of $PbSO_4$ to 12 of melted PbS, we saw it gave rise to 2 molecules of the volatile PbS_2O_2, or that as $PbSO_4$ and PbS_2O_2 have the same molecular weight, the volatilisation was double the addition.

On adding PbS to melted $PbSO_4$ we get as principal reaction the following:—

(7.) $3PbSO_4 + 5PbS = \mathbf{4PbS_2O_2} + 4PbO.$

So that 5 molecules of PbS yield 4 molecules of PbS_2O_2, but as the molecular weight of the latter is higher, 39.7 of PbS would cause a volatilisation of 40·2 of the PbS_2O_2, or about equal quantities.

This reaction only takes places with large excess of $PbSO_4$, as the PbO accumulating sets up secondary reactions.

20 grammes $PbSO_4$ were melted, and 2·3 grammes of PbS added little by little. The residue weighed 19·9, showing a loss of 2·4 as against 2·33 by theory.

When a greater quantity of PbS is added the reaction takes this form:—

(8.) $12PbSO_4 + 3PbS = \mathbf{5PbS_2O_2} + 2Pb + 11PbSO_4.$

The 2Pb react with $2PbSO_4$ yielding $4PbO + 9PbSO_4 + 2SO_2$, so the final reaction is:—

(9.) $12PbSO_4 + 3PbS = \mathbf{2PbS_2O_2} + 4PbO + 9PbSO_4 + \mathbf{2SO_2}.$

I have stated the reaction in these stages, as metallic lead is seen to be set free at first.

When a very high temperature was employed, and the $PbSO_4$ and the Pb employed in the ratio of three to one, there occurred such a loss in weight as was quite inexplicable by the reaction known.

For instance, 30·2 grammes of $PbSO_4$ and 7·93 PbS gave 2·5 grammes of residue, containing 0·75 grammes of metallic lead, while the residue was composed of two-thirds litharge and one-third sulphate of lead. On repeating this reaction many times, the residue was found to vary with the temperature and time occupied in the reaction, and to give results from as high as 27·5 grammes residue to as low as 22·5, while the metallic lead varied from as high as 4 grammes to as low as 0·5. It was noticed, however, that on melting the sulphate there was a very rapid disengagement of SO_2, and the crucible was rapidly dissolved. It was evident that the $PbSO_4$ was being converted into silicate, which, as far as the weighings are concerned, is exactly like being decomposed thus:—$PbSO_4 = PbO + SO_2 + O$, because the silica comes from the crucible, and is weighed with it. The extent to which this reaction is carried at high temperatures surprised me, for the whole fusion and reaction did not take more than 20 minutes, yet in that short time an experiment with $PbSO_4$ alone showed that nearly two-thirds of the sulphate had become decomposed. By many experiments and analyses the following was arrived at as a type of what goes on:—

(10.) $15PbSO_4 + 5PbS = \mathbf{4PbS_2O_2} + 4PbO + 12PbSO_4$, but the $PbSO_4$ has been split up by the silica, $12PbSO_4 = 4PbSO_4 + 8PbO + 8SO_2$. So that the total reaction stands thus:—

(11.) $15PbSO_4 + 5PbS = \mathbf{4PbS_2O_2} + 12PbO + 4PbSO_4 + \mathbf{8SO_2}.$

The above equation requires 12·3 grammes to be volatilised on the quantities above given and 25·7 grammes of a residue. These figures agree with the mean of those obtained. I would here remark that those which showed greater loss of weight usually contained

* It is very probable that the first action of air is to form a low oxysulphide of lead, which is subsequently split up, as I have lately discovered that it is not pure lead sulphide, but a product containing a minute quantity of oxygen, which passes through the pores of the crucible as mentioned by Percy, and that when the sulphide is melted in an atmosphere of hydrogen, it ceases to pass through. Chloride of lead also illustrates this. When melted and electrolysed in an open vessel, oxygen is evolved from the positive pole instead of chlorine, and yet no detectable quantity of oxychloride has been formed, but the minute trace is split up and reformed again and again, acting as a carrier of oxygen from the atmosphere. On placing the chloride in a closed vessel and cutting off the supply of oxygen, the electrolysis yields chlorine. This substance, $PbCl_2$, also passes through pores of crucibles when exposed to air in molten state, but in a closed vessel it ceases to pass, and these facts illustrate a striking characteristic of lead compounds—viz., that it is often some secondary reaction or trace of combination which gives the characteristic property.

more metallic lead. I have noticed that when pure litharge or carbonate of lead is suddenly thrown into a white hot crucible a large part is often reduced to metallic lead apparently by dissociation, whereas when raised to the same temperature slowly no metallic lead is seen. This greater stability is connected in some way with the formation of minute quantities of silicate of lead. The appearance of metallic lead in greater quantity than can be accounted for by any method of double decomposition known to me, I can only attribute at present to dissociation. I have sometimes been led to believe that at high temperatures a more highly oxidised compound than PbS_2O_2 formed the volatile constituent of the reaction, but I have no satisfactory evidence of its existence. Its existence, however, would account for the greater loss by volatilisation without calling in dissociation.

We saw that the addition of $PbSO_4$ to molten PbS resulted in an action equivalent to burning out of the sulphur, leaving a sub-sulphurised lead, and now we see that the reverse treatment—*i.e.*, adding PbS to molten—$PbSO_4$ results also in a loss of sulphur and formation of a basic sulphate, or a mixture of PbO and $PbSO_4$.

When large quantities of PbS are added to $PbSO_4$, the reaction becomes complicated by the accumulation of PbO in the sulphate, and when the temperature was kept high the sulphate still continued to react in part, but if the temperature was allowed to fall as the melting point of the mixture became lower, the sulphide ceased to react with the sulphate, and formed combinations with the oxide. To follow what was going on it became necessary to examine the reaction of litharge with galena.

Percy gives the main reaction as:—

(12.) $PbS + 2PbO = Pb_3 + SO_2$.

And to show that this is the case, and that excess of either reagent does not affect the result, he gives

(13.) $PbS + 3PbO = Pb_3 + PbO + SO_2$; and

(14.) $2PbS + 2PbO = Pb_3 + PbS + SO_2$; thus

showing that the excess of reagent remains unacted upon.

On mixing finely-powdered PbS and PbO in their molecular proportions, and carefully fusing them in an atmosphere of nitrogen, there was formed a steel grey crystalline mass, which was perfectly homogeneous, and containing no trace of metallic lead. In appearance it is scarcely distinguishable from galena, but instead of having the strongly marked cubic fracture, it seems to crystallise in plates. On digesting this substance with ammonium acetate it is entirely split up, the oxide of lead dissolving, and the sulphide being left as a pure black flocculent substance.

In this substance, PbS.PbO or Pb_2SO, we have a compound which plays such an important part in lead smelting, that a more lengthened examination of its formation and decomposition was considered necessary. It seems to be the lead member of the series of compounds of PbS with various oxides, of which the sulphur dioxide member plays such an important part in all furnace reactions of lead, so that instead of PbS_2O_2 or PbS.SO_2 we have Pb_2SO, or PbS.PbO. On heating it to a higher temperature in an atmosphere of nitrogen, a little SO_2 was given off, and the substance in the crucible had settled into two layers, the lower consisting of a quantity of semi-sulphurised lead, and the upper of a black slag.

This was treated with ammonium acetate, and the soluble portion found to consist of PbO and $PbSO_4$ in the molecular proportions of 6 to 7, while the insoluble was PbS in the molecular proportion of 4.

The hard metallic portion was found to contain Pb and S in the proportions of 13 to 6.

These results show that the following is what took place:—

(15.) $12PbO + 12PbS = PbSO_4 + Pb_7 + 10PbS + 6PbO + SO_2$

The product was divided into the two portions as follows:—

(16.) { Slag, $PbSO_4 + 6PbO + 4PbS$ / Metal, $Pb_7 + 6PbS$ or $Pb_{13}S_6$

It will be seen that here again the simple reactions given by the text books do not represent actually what takes place. I have had opportunities for making examinations of the action of litharge on galena in large quantities over a series of years, and in presence of air, and, without going into all my observations, I may succinctly state the principal stages of the reactions which I have observed.

When a small quantity of PbS is added to a large quantity of melted litharge, the following reaction takes place:—

(17) $24PbO + 2PbS = PbSO_4 + 4Pb + 19PbO + (PbS.PbO)$.

The PbS in the right hand side of the equation is not simply the excess added, because when only 1 molecule of PbS is added to to 24PbO, only half the metallic lead is obtained, and still sulphide of lead is found in the residue.

22 grammes PbO + 2 grammes PbS gave 13·6 per cent. of metallic lead, while the theoretical amount is 14·2. The lead was perfectly pure and soft and contained no sulphide, the whole of the sulphide in the right hand side of the reaction being dissolved in the oxide, forming (PbS.PbO).

When the products of the reaction ($PbSO_4$ and PbS.PbO) have accumulated to a certain extent in the resulting slag, further addition of PbS does not cause any further separation of lead, but simply goes to form a more sulphurous slag. Out of hundreds of experiments, I have built up the following stages to show the direction of the reaction:—

(18.).....$24PbO + 9PbS = 3PbSO_4 + 12Pb + 6PbO + 6$ (PbS PbO)

(19.).....$24PbO + 12PbS = 3PbSO_4 + 12Pb + 3PbO + 9$ (PbS PbO)

(20.).....$24PbO + 24PbS = 3PbSO_4 + 12Pb + 9PbS + 12$ (PbS PbO)

Taking the lead out of the right hand side of the equation, the residue represents different qualities of the grey or black slags of the smelters; but, of course, the smelters' slags contain all the impurities of the ore and the fluxed brick.

On further heating these products they go into further decompositions in two different ways, according to whether they are heated in air or in nitrogen.

If heated in nitrogen, the PbS in solution slowly acts on the $PbSO_4$ according to the re-action.

(21.).....$3PbSO_4 + PbS = 4PbO + 4SO_2$

So that further heating does not increase the yield of lead, but only increases the litharge. The tendency of lead compounds, so situated to form the volatile PbS_2O_2, is illustrated by the fact that although the temperature at which these reactions are carried out is low, yet fumes come off from the surface of the molten slag.

In air the reaction is complicated by the fact that the compound PbSPbO greedily absorbs oxygen. This absorbing power is so great that if some is melted in a piece of combustion tubing closed at one end and the thumb applied to the other end, whenever the liquid is shaken, strong suction is felt by the thumb. This oxidation results in a great increase of the $PbSO_4$ present.

The oxidation may be carried on till a mixture containing only PbO and $PbSO_4$ results. Thus:—

(22.)... $5PbO + 5PbS + O_{17} = 2PbSO_4 + 8PbO + 3SO_2$.

This should give a residue containing 25·4 $PbSO_4$, and the materials should increase by 3·5 per cent.

A mixture in the proportions above indicated, and containing 48·1 per cent. of PbO, and 51·9 per cent. of PbS was melted and allowed to oxidise in a muffle till all the PbS had become oxidised, when the residue was found to contain 26·26 per cent. of $PbSO_4$, and to have gained 3·6 per cent. in weight, thus confirming the above equation.

Series of experiments have been made with black slag containing PbO, PbS, and $PbSO_4$, which show that when the temperature is high and excess of PbS present, and especially in a reducing atmosphere, the decomposition of the sulphate by the sulphide into PbO, and SO_2 is the principal course of the reaction, and when the temperature is lower and much oxygen present, the direct oxidation of the sulphide takes a major part in the reaction, and as the reaction may be made to assume either of these directions, I need not detail further experiments in this field.

It may be well to note here, however, that, on adding PbS to melted PbO, the first reaction which takes place is most probably:—

(23.) $4PbO + PbS = PbSO_4 + 4Pb$.

But whenever some $PbSO_4$ is formed, the black (PbS PbO) begins to accumulate.

Another reaction requiring attention when examining the course of lead smelting is that of sulphate of lead with carbon, as this reaction is used in hearth smelting of slags.

30 grammes of $PbSO_4$ were fused in a porcelain capsule, and a piece of charcoal weighing 1·3 grammes plunged into it. Violent effervescence ensued, and the familiar lead fume at once appeared. After the reaction had become very sluggish, the crucible was emptied of the metallic lead, which weighed 8 grammes, and it was found that 10 grammes of silicate and 1 gramme of sulphate were left in the crucible, while 12·5 grams were volatilised. The silicate was remelted, and the carbon pressed into it at a white heat, when it was found that it was scarcely acted upon. It will thus be seen that, during the time required for the reaction (20 minutes), one-third of the sulphate was converted into silicate.

The above proportions agree very closely with the equation,

(24.) $24PbSO_4 + 27C = 21Pb + 3PbS_2O_2 + 18SO_2 + 27CO_2$; or,

$24PbSO_4 + 28C = 20Pb + 3PBS_2O_2 + 17SO_2 + 28CO_2 + PbS$.

as there is generally some sulphur in the lead.

This reaction requires a loss of 12·7 against 12·5 obtained, and the lead and its sulphide should weigh 18·3 against 19 obtained, but taking off the oxygen retained by the litharge the numbers are 18·3 against 18·2 obtained, so that the above equation may be taken as correct. It is rather curious that all the sulphide formed in this reaction may be volatilised, and the single molecule of sulphate which escaped decomposition was enabled to do so, owing to the protective action of the silicate. It is important to note that silicate of lead is not reduced by carbon.

Sulphite of lead when quickly heated splits up in a very complex manner. At first SO_2 is envolved and PbO left behind, but later there is an evolution of the volatile PbS_2O_2, and finally a mixture of litharge and $PbSO_4$ is left. When slowly heated in a hard glass tube the compound PbS.PbO is formed, while sulphur dioxide is evolved, and sulphate of lead formed by the reaction.

(25.) $5PbSO_3 = PbS, PbO + SO_2 + 3PbSO_4$.

On heating 6·1 grammes of $PbSO_3$, over the blowpipe in a hard glass tube it turned black, and SO_2 was evolved till the whole was fused, when 1·358 gramme of SO_2 had been given off. This represents 22·2 per cent., while theory requires 22·3, while the sulphate and sulphide were present in the above proportions. On further heating, SO_2 continued to be evolved, but extremely slowly, as during 20 minutes the loss was only increased to 23·7 per cent. Heating was continued for an hour but no trace of lead was formed, the sulphide reacting on the sulphate to produce litharge as by reaction (21) on page 41. This is another proof that sulphide and sulphate do not react as supposed in the old theory of smelting, as they are here produced by a decomposition so that they could react in the nascent state, and if such a reaction were possible, it would take place in this case.

When the temperature is raised to white heat the reaction goes on to its conclusion, and a portion of the sulphide combines with the SO_2 to form the volatile PbS_2O_2, thus:—

(26.)...$25PbSO_3$ yield 15 $PbSO_4$ + 5(PbS PbO) + $5SO_2$, while 3 molecules of the PbS go to form the volatile PbS_2O_2 and 3 molecules go to decompose the sulphate, thus:—

(27.)...$5PbS + 6PbSO_4 = 8PbO + 8SO_2 + 3PbS_2O_2$, so that the final reaction may be expressed.

(28.)...$25PbSO_3 = 3PBS_2O_2 + 10SO_2 + 13PbO + 9PbSO_4$.

A very interesting point was noted in connection with the PbS PbO compound, showing it to be one of the group which contains the volatile PbS_2O_2 (or PbS SO_2).

I have shown that as soon as the PbS_2O_2 compound passes below a red heat PbS is deposited and SO_2 passes away. That it is pure PbS which is deposited is proved by its cubical crystallisation, and specific gravity, which, when free from oxidation and taken in benzine, is 7·66, while on analysis it gave 13·43 per cent. S, and 86·79 Pb, the theoretical numbers being 13·41 and 86·59.

Now, when PbS PbO is dissolved in PbO or PbSO and heated to a good red heat, the liquid is seen to be quite transparent in thin films transmitting red light; but on cooling it becomes black and perfectly opaque, and on dissolving the PbO or $PbSO_4$ in acetate of ammonium pure PbS is left. Now this behaviour shows that at a red heat PbS PbO compound exists, and is a reddish coloured, transparent body; but, on cooling, the PbS separates out exactly as it does in the SO_2 compound. This also shows that the PbS PbO compound cannot be written Pb_2SO and be considered as a double molecule of PbS (*i.e.*, Pb_2S_2), in which one atom of S is replaced by oxygen, as such a compound would be unlikely to yield PbS on cooling, but would probably be more stable at a lower temperature instead of dissociating. It is curious that these bodies are only stable at a high temperature, and split up on cooling, as the contrary is usually the case with gaseous compounds with solid bodies as in the case of Mond's nickel carbonyl.

I have given much attention to this body, and have watched its reactions with galena on the large scale, as my researches have shown that the oxygen compounds of sulphide of lead play an important part in the metallurgy of lead. It was all the more necessary to make a searching study of the matter as Percy, whose commanding position in metallurgy we all respect, has made the following statement in his book:—"In metallurgical books which treat of lead smelting in the reverberatory furnace, oxysulphide and subsulphide of lead are made to play an important part. I have ignored both, first because I have not met with satisfactory proof of the generation of such a compound as oxysulphide of lead in the furnace, and secondly, the formation of sub-sulphide of lead has not been certainly established, and if it has been, its reduction by means of oxidised compounds of lead would be exactly analogous to that of the mono-sulphide."

Yet I have shown that the cause of fume is the formation of an oxysulphide of lead, and I shall show that the formation of slag is also due to an oxysulphide, and finally, I hope to prove that the production of lead in smelting is in no way due to reduction by means of oxidised compounds of lead, but that it is due to the power of fractionation of the mixture of lead and its sulphide, or what is in the liquid state subsulphurised lead. We have seen that the reaction $PbS + PbSO_4 = Pb_2 + 2SO_2$, does not take place, but even were it a possible reaction it could not take place in smelting, as the temperature is never high enough to melt either of the constituents of the reaction, and in the solid state they do not react.

(To be continued.

MINERS' INSURANCE.—A scheme of national insurance against accidents in mines has been drafted by several Scotch members of Parliament, and has been embodied in the Mining Accidents (Scotland) Bill. This Bill does not follow the French and German systems, whereby the State becomes in effect the insurance society, receiving contributions and paying benefits. But it provides, as they do, for the compulsory insurance of all miners against death or disablement. The insurance fund, administered by a special board of management, is to be maintained by contributions at the following rate:—By lessors and mineowners, ¼d. per ton on the annual output; by underground workers of full age, 2d. per week; by surface workers of full age, 1d. per week, and by workers under 16 years of age, half these weekly sums. It is calculated that such contributions would afford substantial benefits. During disablement men could be paid 5s. for the first week and 10s. for each subsequent week, boys 2s. 6d. and 5s. In case of death the relatives of an unmarried member of full age would receive a funeral allowance of £20; while those of a married member would receive, in addition to a £5 funeral allowance, the following benefits:—The widow, until remarriage, 7s. 6d. per week; the issue, 2s. 6d. for a family of one child, 4s. 6d. for two, 6s. for three, and 1s. 6d. each for the remaining members of a family of more than three. The Bill provides that employers shall be responsible for the insurance of their men, and shall have power to deduct contributions from their wages; and that in the same way mineowners may deduct the amount payable by their lessors from the royalty. Each board of management is to consist of three lessors, three lessees, three employees, and Her Majesty's Inspector of Mines for the district.

MEETINGS OF MINING COMPANIES.

SOUTH AFRICAN TRUST AND FINANCE COMPANY, LIMITED.

A long speech from the chair.—A favourable outlook.

THE fifth ordinary general meeting of the South African Trust and Finance Company (Limited) was held on Monday, at Winchester House, the chair being occupied by Mr. B. B. TRENCH.

The SECRETARY (Mr. J. S. Sheldrick) read the notice convening the meeting.

The CHAIRMAN, in moving the adoption of the report, said he would deal first with the balance-sheet. As to the capital, he had seen it stated in a leaderette in one of the papers that at the last meeting he had said that the new shares had been all guaranteed, and that there was no necessity for the shareholders to take them up. That was literally the case at the time; but, unfortunately, the guarantor had failed, and, consequently, was unable to meet his engagements. In the observations he was about to make he did not propose to adopt either an optimistic or pessimistic tune, as the position of the company did not warrant either; at the same time he would not shirk what he considered to be the material points connected with the company. It was true that through the failure of the guarantee 6314 shares were unallotted; but the matter was so trifling as not to call for serious note, amounting only to about 1½ per cent. on the issued capital. No doubt he would be asked as to the probability of a call, and he wished them to remember that the company started four years ago, and the reason why they had not called up the additional 2s. 6d. was that when they wanted the money the shares were at a large discount. The directors would have been glad to have the call; but, until the company had been able to justify its existence as an important undertaking, they felt it would be unjust to the shareholders, and as long as they could avoid it they wished to do so. No doubt the call would have to be made some time, but it was not anticipated that there would be any immediate necessity for it. The balance-sheet showed active liabilities amounting to £84,000, and on the other side would be found active assets representing £51,000, all of which they were assured were good. There was, therefore, a deficiency of £33,000; but he did not believe they would be called upon to meet this, for the simple reason that the security that their creditors held was ample. First, there was a loan against debentures—£25,000—secured on the uncalled capital of the company, representing upwards of £250,000, therefore, there was no great risk of loss to the lenders. The depositors also held a special security under the trust deed, which compelled the company to set aside certain securities for the benefit of the depositors. Sundry creditors needed no great comment. In South Africa there was a loan of £24,000, and that also was secured by the hypothecation of various stocks, which appeared on the other side of the account in the item of over £200,000. The New Aurora West loan was secured by a first bond over the property; it also occurred on the other side, and was amply secured. Sundry creditors in South Africa were only for a small amount. Contingent liabilities which had been guaranteed amounted to upwards of £30,000, and against that £10,000 had been drawn at the time of making up the balance sheet, while the securities held against those guarantees were ample. The loans against security, £35,000, were put down as an asset, and of the amount £15,000 was due to them by the New Aurora West Company, there being ample security. Altogether the investments amounted to over £200,000. The first item of shares and debentures was practically the same as before. The second item was shares and interests in mining properties, £166,000. The shares in these properties represented £97,000, of which £66,000 was in connection with the Van Ryn and the New Aurora West Companies. Among the other items of the balance were the New Unified Gold Mining Company, which at one time they thought extremely well of, and the New Heidelberg Roodepoort, which at present was doing nothing. Other ventures and options stood at £46,000, and were probably worth more. An amount of £22,000 represented the value of the Prospecting Company's assets, absorbed some 18 months ago, and it was possible these might work out in excess of the amount stated. The footnote, which came next, was not a pleasing matter to refer to. A footnote in the balance-sheet for 1892 stated that there was an appreciation in the then market value of the shares, which did not appear in the accounts, of £48,000. This, added to the depreciation of £35,000 now shown, would make a sum of upwards of £80,000; but, although that had disappeared on paper, he did not think it had actually disappeared, and his reasons for saying so were these. The prices at present were very misleading, being based on quotations for small parcels. The company, however, held large blocks, and it would be almost impossible either to buy or sell those blocks at the prices quoted. The appreciation which had taken place since the accounts had been made up would certainly make up at least £12,000 of the £35,000, and he believed the balance would be made good by the sum represented in the £46,000 of options. It would be seen that the profit and loss account had been rendered in a somewhat different form to that of last year, on the recommendation of the shareholders. The ordinary expenses, exclusive of directors' fees, amounted to nearly £18,000, while the ordinary receipts from agency and such branches of business came to £15,000, leaving only a small balance of £2461 as the cost of running the company's business. For the preceding year the expenses were in excess of the ordinary revenue, exclusive of directors' fees, to the amount of £9000; the reduction was a very favourable feature, and justified the hopes of progress in the general agency business of the company. Rent now appeared as a credit in the accounts, due to the fact of their having purchased Colonnade Buildings and the rents received covering the interest on the purchase, making them rent free in South Africa and London, and leaving a balance to their credit. The item of directors' fees had always been a target for the shareholders to shoot at, but he could not agree that they had been at all well paid. The directors had, however, some time ago voluntarily resolved that during this financial year the fees should be reduced from £2000 to the paltry sum of £500, and while the company earned a profit they proposed to take for themselves 10 per cent. of that until it amounted to the sum which the Articles of Association provided as a maximum. In the event of there being no profits they would not take a penny beyond the £500. (Cheers.) He thought it quite likely some of the directors might feel inclined to resign, but there would be sufficient left to carry on the business satisfactorily. The 10 directors were compelled by the Articles to hold 500 shares each, with a total of 5000 shares; but the actual holding registered in their names was 27,000 shares and 30 founders' shares, while if they added other names which were subsidiary to the directors, the total holding represented by the board was over 40,000 shares and 50 founders' shares. The next item was that of expenditure on undertakings since abandoned, £6044. One of these was the Crawford mill for the reduction of ore, for which they were to be appointed agents, and for which, had it been successful, the company would have reaped a very large return. On this they had lost about £1800. Another item of the expenditure was the Salmon Block, now called, he believed, the Victoria Randt Deep Level, a very valuable block, selected by their manager, and for which they obtained an option costing them £1500. Upon the expiration of the option it was necessary to provide another £70,000 to carry out the matter, and, as the company was not in a position to do this, they had to abandon the option. There were other items, such as assays made in connection with properties investigated and the Mashonaland report which the directors had had made. Those two matters amounted to about £800, leaving a difference of some £1800 distributed over a vast number of things. Although the £6000 appeared in the accounts as a large item, in the previous accounts there was a sum of £2200 which had been similarly ex-

pended. A balance remained at the foot of profit and loss account of nearly £1800. This looked at first sight as if they had made a profit this year, but it was not so, as a certain amount was brought into the account on the credit side. Profit on the sale of stocks, shares, and bonds amounted to £5408. This would have been greater but for a loss on the realisation of Metropolitan shares and Albert Silver Mining shares, amounting to £7000. The estimates for the current year showed that the ordinary revenue might be expected to be about the same as it was in the previous year. He was not responsible for those estimates which came from the other side, but he had no reason to doubt them. The estimate of ordinary revenue showed that after deducting the ordinary expenditure there remained a balance of something less than £300 as the cost of running the company's business. Judged by the accounts of 1892 and 1893 that estimate was not over-sanguine. The saving in expenses on the current year would be £1500 in directors' fees, in salaries £1000, and in other items about £1000. The gold output of the Randt in 1888 was 237,000 ounces, but in 1893 it rose to 1,478,477 ounces of a total value of £5,432,000. In an interesting pamphlet, written by Mr. W. Y. Campbell, on South African progress, it was stated that he estimated that in 1893 the output from the Randt would be £7,750,000, in 1895 it would be £9,000,000, and in 1896 £10,000,000. In conclusion, the Chairman stated that although they had had great difficulties to contend with, he did not think there was anything in the past or present that would shake their confidence in the future of the company. He believed that they were grappling with the difficulties that arose on the other side, and that the future was likely to be more satisfactory than the past. In regard to the profits of the founders, he said it must be borne in mind that of the £20,127 shown as profit, £5600 had been brought forward as profits of preceding years, and, after deducting that and the dividend, the balance was divided between the ordinary shareholders and the founders, the amount allocated to founders' reserve account being £1437. Mr. Trench concluded by moving the adoption of the report and accounts.

Sir STUART HOGG seconded the motion, saying that the company were the holders of very many valuable mining claims and shares in other South African ventures which it was reasonable to suppose would one day become highly remunerative. To his mind, therefore, there was no ground for despondency, and he trusted that upon the next occasion of meeting they would be in a dividend-paying condition.

Mr. CONCANNON was unable to look with any satisfaction upon the results of the year's working. The present state of the company's affairs could only be met by the introduction of economies into the management. He regretted to find that their investments showed a depreciation during the 12 months under review of £84,000, which was attributable to two investments. He fully appreciated the generous offer of the directors to decrease their fees, but thought it would be better if the number of the directors were reduced. He could not help thinking that five would be a more satisfactory number than ten. He hoped the board would not increase by 1s. any of the investments until they had realised something upon those already belonging to the company. In conclusion, he suggested that a friendly committee of shareholders should be appointed to confer with the board as to the company's present position.

Mr. GEORGE THOMPSON enquired whether the directors had made any deals that might be to the advantage of the company, and what else the company was interested in besides the Van Ryn, and the Aurora West.

Mr. HIBBERT enquired what was the limit of the directors' power to issue debentures.

Mr. LYALL did not deem the new form of the company's accounts an improvement upon the old one. He wished to see the expenditure placed upon one side and the receipts upon the other. He did not like debentures at all, and he thought the directors would have been better advised had they made a call at once, instead of borrowing so much. Upon the whole, he thought the frank and candid explanation which had come from the chair the most satisfactory thing about the whole of the company's position.

Mr. TODD asked for an explanation of the reason why the initial sum had been paid for the option of taking up a property in South Africa when the company could not find the money necessary to complete the matter. He could not help thinking that the unsatisfactory nature of the past years financial results a sufficient justification for the appointment of a friendly committee to confer with the board of directors.

Mr. GODFREY characterised the balance-sheet as an "extraordinary" one, and said he thought the amounts paid for salaries and general expenses somewhat excessive. There appeared to him to be a superabundance of directors, and he supported the idea for the appointment of a committee.

Mr. HAMILTON asked for some information as to the arrangements between the board and Mr. W. J. Campbell, the company's manager.

Mr. PAYNTER asked for the details of the expenditure upon salaries in England.

Mr. THORPE was opposed to the appointment of a committee of shareholders, and suggested that if the board had confined its attention to the trust and finance business, instead of speculating in shares, the company would have been in a more satisfactory position.

The CHAIRMAN, in replying to these and other questions, said, with reference to the proposal for the appointment of a friendly committee, that he was always glad to see any individual shareholder, and to answer any questions they might ask as to the company's affairs. The proposals for the reduction of the directorate and the appointment of a committee seemed to him to be in some sort contradictory. In regard to the management, it certainly was almost impossible for the board of directors at home to exercise a very close control over the management upon the other side but latterly the directors had thought it wise to exercise somewhat more control, and no steps of very great importance had been taken with the approval of the London board. The mistake of the past had not been so much the going into the ventures with which the company had become associated, but in their not taking partners in those ventures. They had been told, however, that the ventures were such good things that it would not do to allow anyone else to have a hand in them. The directors had had the matter before them, and the policy of the past would not be pursued in the future in that respect. Mr. Concannon had enquired why there was a manager as well as a secretary in London. Now, it had been said that the company had too many eggs in a limited number of baskets. A casual glance at a document carrying the information told him that the number of baskets was about 50, and it was easy to see what a tremendous amount of correspondence such a large connection would necessitate. Each South African mail brought with it a voluminous correspondence for the secretary and manager to go through and report to the board upon. The question had been asked as to whether the board had taken any steps to get a report as to their property in Mashonaland. The answer to that was that an engineer had been sent up the country to report. The company had 75 square miles in a gold bearing country, and the board believed it to be of a great value. Besides this property the company owned 14 farms in Matabeleland. The board would bear in mind the request which had been made for some more detail in the accounts, and every effort would be made to meet it. In judging the expenses of administration it should be remembered that the agencies had to be kept going, and it was hoped that they would eventually make the company absolutely self-supporting. With regard to the Samsen block, the option had been taken in the belief that there would be men in the City who would be willing to go into it. That had turned out not to be the case. In the Van Ryn the company had a very valuable asset. As to the Aurora West, that at present was not in a satisfactory condition, but they were waiting for a report from the other side before expressing a definite opinion. They had already received a report from him as to the Van Ryn, and it was the deliberate opinion of the directors that the company had there a very valuable property. Mr. Thorpe was wrong in the idea that the company was originally formed without the intention of embarking in South African mining schemes. It might, perhaps, be difficult to mention any South African schemes which were not mining schemes.

The motion for the adoption of the report was then put and carried unanimously.

Mr. CONCANNON asked the Chairman to take an expression of opinion as to the formation of a friendly committee. In the event of that being done the question of the numerical strength of the directorate might be left to the committee. He formally moved a resolution to this effect.

Mr. TODD seconded the motion.

Several SHAREHOLDERS appealed to Mr. Concannon not to persist in his motion, and accordingly it was withdrawn.

Mr. CONCANNON then moved, and Mr. PAYNTER seconded, a motion inviting the directors to limit their number to five, which was carried unanimously.

Major COTTON then moved the re-election of Messrs. Archibald Parker, George H. Raw and Benjamin Bloomfield Trench, the retiring directors, saying that none of the directors took a greater interest in the affairs of the company than these three gentlemen.

Mr. RICHARD SMITH seconded the motion, which was carried unanimously.

Messrs. Deloitte, Dever, Griffiths, and Co., the auditors, having been re-elected, the meeting terminated with a vote of thanks to the Chairman.

PALMAREJO MINING COMPANY, LIMITED.

The Advisory Committee and the directors.—A new board to be elected.

The ordinary general meeting of the shareholders of the Palmarejo Mining Company (Limited) was held on Wednesday, at Winchester House, the chair being occupied by Mr. FREDERICK PIGO.

The SECRETARY (Mr. R. J. Scriven) read the notice convening the meeting.

The CHAIRMAN, in his opening speech, stated that the only information he had to add to the report was a telegram which had just been received from Captain Drake, as follows:—"What is the prospect of improvement in the water ditches? From the scarcity of water we are running 25 stamps. Will be able to remit towards the end of April $15,000." He then proceeded to comment upon the report of the advisory committee, the first paragraph of which referred to the general meeting held on 27th April last year, when they were requested to continue as a committee. "At that meeting," the committee said, "the directors objected to our continuing if we were to have a voice in the disposal in the preference capital, the raising of which was then sanctioned." That preference capital was raised to pay certain debts, and was sanctioned for that purpose; the board had no right to divert it; indeed, the amount realised from the issue of preference shares was insufficient to meet all the debts, some of which had to be discharged by the issue of debentures which were in hand. Some of the work done by the company was undoubtedly badly designed and inconvenient, but as about £100,000 had been spent on the works, and the outlay required not only to put it right, but also to enable double the quantity of ore to be treated, was under £10,000, the statement in the report of the committee was too sweeping, and was calculated to mislead. In stating that the board had committed the company to certain preferential charges, the committee's report omitted to mention that the original agreement with the Mexican Mineral Railway Company, by which the company undertook to pay at the rate of 16s. per ton for a guaranteed outturn of at least 80 tons per day, was not made by the present board, and that the onerous terms of that agreement, in the event of the expected outturn of 80 tons per day being doubled, might have had something to do with the terms of the lease of the railway and conduit. As to the 7 per cent. interest on first debentures, the guarantee on the Mexican Explorations, and the issue of second and third debentures, the committee forgot, in their anxiety to saddle the board with blame for what were now thought heavy charges, that the whole of the circumstances attending these matters were brought fully before and approved by the shareholders at the time when the various issues were made. As to the London office expenses, they amounted to £2026, but he admitted that by including the remuneration of the trustees for debenture holders the total was brought up to £2500, or rather would have been had the directors been paid. The board were in no way responsible for the estimates, either of the cost of the works or of the working cost per ton, and it was impossible to test the latter in any way until the whole of the works were completed and in operation. It was very easy to be wise after the event, and it would have saved the board a world of anxiety and trouble to have thrown up their hands in the middle of the work, and left the shareholders with the works half completed with no funds to complete them and with the mine unproved. The Chairman then declared that the whole of that part of the report dealing with the past finances of the company showed a very great want of knowledge of the history of the undertaking. The proposal for an amalgamation with the Mexican Mineral Railway was no new one. It was the opinion of the board, as well as of the committee, that the best interests of both the shareholders and the debenture-holders of both companies would be served by an amalgamation—(hear, hear)—and, in fact, it was absolutely indispensable to both companies that an amalgamation should take place. (Hear, hear.) He wished to explain the motives which actuated the board in taking the lease of the railway company's works in November, 1892, instead of keeping to the terms of the original agreement. Under the original agreement, so long as the quantity of ore treated per day should not exceed 80 tons, they were liable to pay £19,200 per annum for the railway. Before November, 1892, it had become perfectly evident that it would be necessary to contemplate an increase of the milling capacity to 150 tons per day. Had this been done without special arrangements with the railway company, that company would have been entitled to a payment of £36,000 a year under the original agreement, and it was, therefore, important to make an arrangement with them at once which would limit the cost of carrying and treating the larger quantity of ore. The terms settled by the lease were a compromise, by which it was intended that the railway should receive a fair interest on its capital, and that this company should obtain control of the line, and be in a position to increase the outturn from the mill without any increase of the cost of haulage and power for working the mill. Passing on to deal with other statements in the report, the Chairman said that the company had now for many months not only been paying its working expenses in Mexico, but also earning enough money to make pretty regular remittances to England, and it was somewhat curious that the very moment when the works were ceasing to make calls on them for funds should be chosen to recommend a change in the official staff of the company. Proceeding, the Chairman admitted that the board had made mistakes, but claimed that they had never acted carelessly. They had backed up the company, both with work and with money, to the very utmost of their power, and had not in any way sought to advance their own interests at the company's expense. The Chairman concluded by moving the adoption of the report of the directors and the accounts for 1892.

Mr. APPLEGARTH seconded the motion.

Mr. SOUTHCOTT enquired whether the directors intended to place their resignation in the hands of the meeting?

The CHAIRMAN said he would deal with that matter afterwards. The question before the meeting was in reference to the report and accounts.

Mr. JOHNSON hoped the present directors would not retire in a body, and so oblige the company to lose the benefit of the large experience they had acquired. Other gentlemen might be, perhaps, added to the board, but he hoped the experience acquired by the board would not be lost.

Mr. SOUTHCOTT moved an amendment. Referring to the failure of the directors to fulfil their promise to call the meeting not later than the middle of February, he said the board refused to call a meeting, and they probably would have refused up to the present time had the committee not gone to the trouble and expense of preparing a requisition. That unfortunate company had been in existence some eight years; it was formed with most brilliant promises, kept together with most brilliant promises, and in spite of what the Chairman said, he still asserted, by most misleading statements. In support of this view Mr. Southcott drew attention to a speech delivered by Mr. Pigou in 1890 after his return from Mexico. The Chairman then showed them three samples of ore, and he told them that the first gave 2535 ozs. of silver to the ton and $655 worth of gold. The second sample was more moderate and gave $1365 of silver and $1911 worth of gold to the ton; while the third was still more moderate, giving $60 worth of silver and $12 worth of gold. It was his contention that as there was never any bulk that yielded gold and silver to anything like that extent the statement was altogether misleading. Mr. Southcott went on to say that the capital of the company had grown from £400,000 to £650,000 by the issue of debentures. Interest had been paid upon those debentures entirely out of capital, and on the present occasion, with accounts up to December, 1892, they found that the result of the directors' labours was a loss of £108,000 worth of capital, and he ventured to assert that if the accounts had been made up to 1893 the loss would have been nearer £150,000. The whole of this loss would have to be written down at some time or other. These results, the committee contended, were occasioned by extravagance and mismanagement both at home and abroad—(applause)—and also by the dual control exercised over this company and the railway company by the Chairman, in which he had attempted the impossible task of trying to please two masters. (Hear, hear.) The Palmarejo shareholders, unfortunately, had to bear the whole of the interest upon the capital of the two companies, which amounted to the gigantic sum of £850,000. The speaker proceeded to read extracts from the reports to support his charges of bad management, quoting the statement made by Captain Drake to the effect that one mile of the bottom of the conduit was rotten, and that the remainder was so defective that before the water ran to the end of it a large percentage was lost. And yet their water power was the life-blood of the undertaking for if they could not get the water power they could not drive their mill. Captain Drake indicated several matters which the Chairman, upon his return from his two visits to the mine, should certainly have laid before the shareholders, but these had been kept back. He contended that the condition of affairs at the mine, as revealed in that report, and that of Mr. Hooper, was a disgrace and discredit to everyone connected with the management of the two companies. (Applause.) In order that the shareholders should thoroughly understand the position of affairs between the two companies, the speaker referred to an agreement concluded in October, 1888, between the Palmarejo Company and the Mexican Mineral Railway Company. The latter were to construct this railway, and their capital was to be £75,000 in shares, and £50,000 in debentures, the Palmarejo Company guaranteeing them during construction interest at a certain rate per annum. In order to enable that to be carried out a sum was deposited with two trustees, and that sum was absorbed. The agreement was very unfair to the Palmarejo, for it fixed no time in which the works were to be completed, and it specified that the company, when the work was finished, should pay freight at the rate of so much per ton, and that the railway company should compel the mining company to take a perpetual lease of the railway and conduit The shareholders and future directors should not, however, forget that this agreement also provided that the works should be permanent and sound. (Hear, hear.) In August, 1891, the railway company had not sufficient money to complete the railway and ditch, and they, therefore, borrowed £23,000 in debentures. At the time when the money was borrowed it occurred to the directors of the railway company that they had not got a guarantee from the Palmarejo Company for this additional capital. Mr. Pigou was appointed to represent the Palmarejo on this matter, and when he (Mr. Southcott) came to the bottom of the award he was not surprised to see that the arbitrator had given it against this company. Again, in 1892, the railway company were hard up, and they could only get money on the good name of the Palmarejo Company, who made an issue of debentures, and lent the railway company £20,000 or £30,000. In November of that year they entered into an arrangement with the railway company to take a lease for 21 years, and they gave the railway company such terms in that lease as they were not justified in doing, but in addition to that they concluded a secret arrangement with the railway company which had never been explained to the shareholders, but which he (the speaker) would now explain. Under this arrangement they precluded themselves from making any claim whatever for the defective railway and conduit, and they guaranteed the whole of the railway company's debenture issue, which matured in November, 1895, and they actually guaranteed the premiums and bonuses, amounting to £12,000 or £13,000, which would have to be paid in that month. (Cries of "Shame.") They had put a burden on the back of this company which it was not able to bear. Fortunately, there was one clause in the agreement which had to be ratified by the shareholders in general meeting. They had never ratified it, and he felt certain they never would. (Cheers.) Besides, he believed that the directors had acted *ultra vires* in entering into that agreement, and the committee were legally advised that so far as the shareholders were concerned, that precious agreement was waste paper. Mr. Southcott proceeded to urge the meeting to reject the accounts now presented, and at the same time to pass the amendment which he would propose, which would have the effect of repudiating the agreement to which he had referred. Mr. Southcott proceeded to condemn the handing over of £5000 worth of first debentures to the Mexican Explorations, and referred to the manner in which they had dealt with the stores passing under the lease. Under the agreement made with the railway company, the mining company were to pay for certain consumable stores, &c., but to take over the bulk on lease, it being left to Captain Drake to decide the value of these stores. The directors had sent Captain Drake a full list to value, which he returned, saying practically, "What fools you are: can't you see that these pass with the lease?" Yet the directors had not had the common decency to wait for this reply, but had actually credited and paid the value to the Mexican Mineral Railway Company at a time when this company were being pressed for money. ("Shame!") Referring to the difficulties of carrying on negotiations between the two companies with partially identical board and the same secretary, he said the whole thing became such a solemn farce that they had to give it up, under existing conditions. The Chairman, when he appeared before Palmarejo shareholders said he was a Palmarejo man, and when he appeared at the Mineral Railway meeting he was a Mineral Railway man. (Laughter). The only solution of this was that their Chairman had a brain divided into two parts; one half was the one company's, and the other half belonged to the other. In conclusion, he moved as an amendment, "That the report and accounts now presented by the directors to the meeting be rejected, and that the report of the advisory committee of shareholders presented to the meeting be received, and its recommendations approved and adopted, and that the committee be and they are authorised to call such meetings as they think fit to carry out their recommendations." (Cheers.)

Mr. T. H. WESLEY seconded the amendment.

The CHAIRMAN replied to Mr. Southcott, saying he had hardly expected so violent an attack as the one to which he had been subjected. The promised meeting was deferred because the information which the directors were desirous of presenting to the shareholders had not come to hand. What they wanted arrived a fortnight ago, and this meeting would have been called had there been a requisition prepared or not. Alluding to the "promising" circulars which have been sent out, the Chairman said the shareholders had generally complained that these were not promising enough. He had been told he looked on the black side of things, and never gave them any encouragement. ("Oh.") As to the funds that had to be raised to complete the works, of course they were bound to have the money, and they had, he admitted, to give excessive terms now and then in order to get it. Having contended that there was no "secret" agreement at all, the Chairman said that the money to be paid to the railway company under the lease was only slightly in excess of what would have to be paid had there

been no lease at all, and if they had kept to the original agreement of 1888, it would practically have put a stop to their power of increasing their works and their outturn without paying a fine on every occasion that they did so. The £5000 of debentures alluded to were handed to the Mexican Explorations as security, for two years, for their debt of £3750, and these could be got back at any time within that period upon the payment of that £3750. These debentures were given because the Mexican Explorations would take nothing else, except cash. He denied Mr. Southcott's statement that the stores of the railway company were paid for.

Mr. PETERS, one of the advisory committee, said he could not agree with the Chairman that the company were no worse under the new agreement than under the rate per ton. During no year had more than 20,000 tons of ore been carried over the railway. In conclusion, he should like to know how the new process was going to increase the production without any addition being made to the stamps.

Mr. APPLEGARTH, in explanation, said that at the present time the ores were dry crushed, whereas with the new process the ores would be treated wet.

Mr. PETERS held that what was really wanted was an addition to the stamps.

Mr. J. H. COLLINS thought the shareholders might like to have the views of a mining engineer who was thoroughly acquainted with the country and its methods of working and its people. There was, to his idea, only one grain of hope and only one. They might rely upon it that the mine was both extensive and valuable, as they had been told it was in March, 1887. They might, however, have an extensive and valuable mine without being able to support an expense of £2500 a year for London management, and another expense of $30,000 a year for management in Mexico. They had got returns for the first half of 1893, and there was a local profit shown of between $3000 and $4000, and to accomplish this the exploratory and development work had been kept back a good deal. He thought that for 1893, notwithstanding that a large sum had been raised by debentures, that the position of the company would be found to be not much beter. As to the past management it was easy to see from the documents put into their hands that the mine was being opened up in an exceedingly insufficient and inefficient manner. It was abundantly clear from the reports that the present works were very badly laid out, and that they were equally badly equipped. The company were also under crushing obligations to pay for very badly designed and very badly executed water works and railway. A tramway worked by mules could have been constructed and worked at quarter the cost of the railway. He believed that the ordinary shareholders would never come within sight of a dividend, and that the mine would never be wisely and economically managed unless the meeting supported the committee, and carried their amendment. He had nothing to say against individual members of the board, but that their admistration in the past had been uniformly disastrous.

Sir EDWIN GALSWORTHY suggested that the best course would be to adjourn the meeting on the understanding that the board and committee should meet in the meanwhile, and decide upon some names to be proposed for directors at the next meeting.

Mr. SEWARD BRICE, Q.C., said he had a strong opinion as to the invalidity of the agreement concluded between the two companies, but if it should turn out to be valid its provisions would merit the severest condemnation. He was inclined to be rather more sanguine as to the future of the mine than some of the shareholders who had spoken. In the event of the carrying out of the contemplated arrangement and a maintenance of the output, he thought the profit should reach about £4000 or £5000 a month. Mr. Brice concluded by moving the following amendment:—

> That the meeting be adjourned until Tuesday, May 22, and that the directors and committee be requested meanwhile to confer together and to arrange, if possible, the names to be proposed for election as directors at the adjourned meeting; that the directors and committee confer with the Mexican Mineral Railway Company with a view of arranging terms for the taking over of that undertaking by the Palmarejo Company; and that the committee and directors report to the adjourned meeting.

Sir EDWIN GALSWORTHY seconded the amendment.

Mr. BRICE suggested the possibility of electing the directors at the present meeting.

Mr. SOUTHCOTT said he had no objection to Mr. Pigou being re-elected to a seat on the directorate in the event of his resigning his position upon the board of the railway company.

The CHAIRMAN said if he were re-elected it must be on the understanding that he should not resign his position upon the railway company.

A short conversation then took place between the CHAIRMAN, Mr. BRICE, and Mr. SOUTHCOTT, as to the names to be proposed for directors.

The CHAIRMAN said the names decided upon were those of Messrs. Southcott, Peters, Wesley, Seaward, Brice, and himself. Mr. Applegarth had not been proposed, but he did not agree to retire from the board.

Sir EDWIN GALSWORTHY strongly urged the adjournment of the meeting. He felt sure that in attempting to decide the matter now they would inevitably get deeper into difficulty.

Mr. BRICE'S amendment for the adjournment of the meeting was then put and carried unanimously.

The proceedings then terminated.

LINARES LEAD MINING COMPANY, LIMITED.

A large dividend notwithstanding the low price of lead.

The half-yearly meeting of the Linares Lead Mining Company (Limited) was held on Thursday, at the offices of the Company, 6, Queen Street Place, the chair being occupied by Mr. RICHARD DONAGHAN.

The SECRETARY (Mr. Henry Swaffield) read the notice convening the meeting.

The CHAIRMAN: Gentlemen, I beg to move the resolution—"That the reports now taken as read, together with the accounts and balance sheet, be received and adopted." I am sorry to say that we have not with us to-day our esteemed colleague, Mr. Henty, as he is away for the benefit of his health. It is nothing serious, but he has lately been a little out of sorts, so he has gone to the West of England to recruit, and thus the distance was too great for him to come to London to attend the three meetings to be held to-day. We are pleased again to come before you with what, under existing circumstances, is a decidedly favourable report. At our last meeting, held in October, I had to speak of the profit then dealt with having been made with lead at the merest fraction over £10; on this occasion I have to speak of sales of lead under £10. With this state of things, it is clearly a subject for congratulation that a profit of £3595 has been made, and that, moreover, after writing down our stocks on December 31 to the reduced values which then ruled, and which reduced value of stock was, of course, so much off the profit of the half-year in which the drop occurred. This result has been effected partly by the help which the Quinientos Mine has afforded through the very rich shoot of ore at the 150 fathom level, and partly by the strict economy which has been exercised both in Spain and England. This improvement in the Quinientos Mine was first mentioned in the report issued a year ago, and when it was stated that the level in question was expected to open up valuable ore ground in the current half-year, which it did do completely, for the reserves in that mine, which were 1200 tons a year ago, were 2700 tons six months afterwards. Six months after that—that is to say, in the superintendent's present report—the reserves are estimated at 4000 tons. This, of course, cannot go on much longer in the 150 fathom level; but we have a level at 165 fathoms advancing towards the spot and the shaft has been sunk sufficiently for a 185 fathom level, as to both of which Mr. Taylor will doubtless have something interesting to say. And now comes the important question of what to do with the £3,595 profit we have made. The custom of this company has been for the directors, as soon as they found by the making-up of the accounts what profit there was, and as soon as they found they were in a position to distribute it, to declare a dividend and to hold the meeting afterwards; but on this occasion, owing to the state of the lead market, when we made out the amount of the profit, we were not prepared to say how much of it we could afford to divide, and, therefore, determined to postpone the matter until the meeting itself. A fortnight ago, upon proceeding to settle the draft of the report of this meeting, we thought it pretty clear that we might venture to appropriate all the profit, provided payment were not made until May 5, and and we, therefore, recommended a dividend of 4s. a share and £500 to be put to the reserve fund. The result of a fortnight's further insight into the matter is that we see no reason to alter our recommendation, and accordingly a resolution to that effect will be submitted at a later stage of this meeting. The dividend paid on October 14 last having been 5s., and the dividend to be declared to day being 4s., makes 9s. per £3 share for the year, which is 15 per cent. on the capital of the company, £500 being put to the reserve fund on each occasion, making £1,000 reserved during the year. So we have not done very badly, and, personally, having regard to the selling price of lead, I look upon it as a marvellous result. After Mr. Taylor has made his statement regarding the mines, we shall be pleased to answer questions.

Mr. EDWARD J. ST. JOHN seconded the motion.

Mr. JOHN TAYLOR said that the realisation of a profit of £7800 for the year, and the payment of dividends amounting to 9s., was a very satisfactory record in view of the dreadful condition of the lead trade. Beyond that, they had the fact that, chiefly in consequence of the productiveness of the Quinientos Mine, there was a further substantial increase in the reserves, bringing the total now up to 7000 tons, against 5200 tons a year ago. In the Quinientos Mine the 165 fathom level east of Taylor's engine-shaft had passed through a shoot of ore, for some distance worth about 2 tons. That was during the months of November and December. It had been driven as fast as possible towards the rich ore ground. The 150 fm. level east of Taylor's engine-shaft had laid open a valuable lode for a considerable distance, worth on an average close on 5 tons a fathom. The level had fallen off somewhat lately, but that was to be expected, as they had probably nearly reached the limit of the rich lode. They would easily understand that they wished to pursue the work with great vigour, and Taylor's engine shaft had been now sunk to a depth for another level, the 185 fathom level, and the development of the lode at this point would be pushed on with all energy. There was another good feature, and that was in the 200 fathom level west of Peill's engine shaft, where a great improvement had taken place since the report of the agents was written. For some weeks past this level had been going forward in a lode worth 3 tons a fathom, and had opened up a valuable piece of stoping ground. Every effort was being made to economise and to keep down the cost as much as possible, so as to be able to extract the ore at profit, even at the present miserable price of lead. There was one other satisfactory matter which the shareholders would have noticed, and that was that the tributers work, though it had slackened a little lately, was still of such a kind that they might look forward to good profits from it for some time to come. (Applause).

Mr. S. WILDE thought the success which had attended the management really wonderful, considering the depressing condition of the lead market, and he thought they might reasonably ask the directors to pay the suggested dividend of 4s. He was always an advocate of putting money into the reserve fund, but having put by the sum of £1000, to do justice to themselves and their successors, he thought they should do similar justice to themselves by paying a dividend. The Linares Mine had proved to be rich in depth, and he hoped it would continue to be so.

Mr. W. HART asked for some information respecting an item of £334, entered in the accounts as loss upon exchange, saying he should have thought there would have been a gain rather than a loss upon exchange. He knew that in times past the board had invested the reserve fund in Consols, and he presumed that they had good security for their present investments.

The CHAIRMAN explained that at the time the investment was made Consols were very high, and they decided to let the amount remain at the bank. The item of loss on exchange was simply a book entry. There was generally a gain upon exchange, the lead being sold for English bank notes and the bank notes being exchanged for a larger equivalent of Spanish money when the rate of exchange was low; but it occasionally happened—as in the present case—that the lead was valued in Spanish money, and its equivalent in pounds sterling was somewhat lower.

The motion for the adoption of the report was then put and carried unanimously.

The CHAIRMAN moved a resolution authorising the payment of a dividend of 4s. a share, free of income-tax, which, having been seconded, was carried unanimously.

The CHAIRMAN then moved, and Mr. WILDE seconded, a resolution, authorising the writing off from the profit and loss account of the sum of £500, to be placed to the credit of the reserve fund.

The motion was carried unanimously.

Mr. EDWARD ST. JOHN moved the re-election of Mr. R. Donagan and Mr. Robert Henty as directors. Unfortunately, Mr. Henty had not been very well for some time, and had gone to the West for a change. He had offered to come up to the meeting; but, no doubt, the shareholders would not wish him to make so long a journey for that purpose.

The motion was carried unanimously.

The CHAIRMAN briefly returned thanks, and, with the re-election of the auditors, Mr. J. W. Jepps and Mr. S. J. Wilde, the proceedings terminated.

THE FORTUNA COMPANY, LIMITED.

The mine pays its way.—An improvement in the production.

The half-yearly general meeting of the shareholders of the Fortuna Company (Limited) was held on Thursday, at the offices of the company, 6, Queen-street-place, the chair being occupied by Mr. RICHARD DONAGHAN.

The SECRETARY (Mr. Henry Swaffield) read the notice convening the meeting.

The CHAIRMAN said: The first resolution to be submitted to you is "That the reports now taken as read, together with the accounts and balance-sheet, be received and adopted." In moving this resolution I am sorry not to be able to report a better profit, but the sales of lead have been made at such low prices that the proceeds were but little more than the cost of production, and what little profit there was became almost neutralised upon the reduced valuation of the stocks in hand, rendered necessary by a fall in the market value of lead. The mines themselves, too, have not been so productive as they were at one time. The sales of lead have been rather larger in quantity than they were in the corresponding half of last year, and the amount of cash produced by the sale of such larger quantity was practically exactly the same as the amount of cash realised for a less quantity during the period referred to; but that achievement has led to there being less stock on hand at the close of the half-year and less reserves in the mines than there were. The drop in the reserve had been chiefly in the Los Salidos Mine; the drop in the Canada Incosa having been only 200 tons in the year, and which occurred in the first half of it. In Los Salidos there has lately been an improvement in the 200 fathom level, and as there is a strong lode in a winze now sinking from the 188 to the 200, it is likely that we may have good returns from this spot. It is satisfactory to be able to call attention to the sound position of the company. To begin with, the amount at one time standing to the debit of profit and loss was extinguished by the profit of last half-year, and a small credit balance established, to which we now add the trifling sum of £21 5s. 10d., profit on this occasion so that if we should be so fortunate as to make substantial profits in the future, either by improvements in the mines or a rise in the price of the metal, or both, there would be no leeway to make up, and such profits would be immediately available for the shareholders. Then, if you turn to the balance-sheet, you will see that in addition to a respectable balance at the bankers' on current account, we had cash at interest on deposit at the bankers. Of course, we have the item bills payable appearing on the other side, but these become due at various dates; and, in the meantime, the proceeds from further sales of lead come dropping towards them. Last, but not least, we have the reserve fund securely invested in £3889 Consols, and thus convertible at any time should occasion arise, but which we do not anticipate. We may not have occasion to use it, and hope we shall not, but still a substantial reserve fund in Consols is a tower of strength to any company. I know that the watchword of shareholders is "Dividends, dividends," and that the things I have referred to do not actually conjure them up, but as our report speaks of "tiding the company over the present period of extreme depression" it seems fitting to refer briefly to the manner in which it is being done. The report also speaks of the improvement that would immediately take place in the company upon an advance in the value of its product. The above facts show that this is no mere platitude, but is founded on the circumstances of the case. Let us hope that such advance may occur, and that the Fortuna Company may longer belie its name, but may yet bring at least a measure of fortune to the proprietors. Mr. Taylor will give us his usual account of the mines, and then we shall be happy to attend to anything the shareholders may have to say.

Mr. F. H. SIMMONDS seconded the motion.

Mr. JOHN TAYLOR said the reports from the company's mine had recently been somewhat brighter, but no very rich ore had been developed since the last meeting. The 110 fathom level west of San Pedro shaft and the 150 fathom level west of O'Shea's shaft had been driven a good distance during the year. In the 200 fathom level, east of Taylor's shaft, an improvement had been noticeable. For some time the lode was of little value, but it afterwards became worth 1½ ton, and since then it had been reported as yielding 2 tons to the fathom. They were opening up a fair amount of stoping ground, and there was also a winze going down towards that level from the 188 fathom level above in a lode worth 2 tons. They would readily understand that the present very low price of lead militated against them, not only by greatly reducing the profit they derived from working the richer ground, but also, as indicated in the report, by deterring them from working at many places, which would, with a better price of lead, largely assist the returns, and so decrease the proportion of general expenses to the ton. So they would see that the present state of the lead market was a very serious matter. They had rather more than paid their way during the half year under consideration, and it was quite clear that in order to make a substantial profit they would have either to make a good discovery, or to have a better price for the lead.

Mr. HURST asked how it was that the income tax stood at so high a figure when the profits were so small The price of lead was a very serious matter, and at the present rate of production he felt doubtful whether it would improve for a long time to come. That being so it might be a question whether it would not be better to realise upon the property and pay the amount among the shareholders, rather than go on and find the value of the property getting lower.

Mr. WILDE explained that the income tax was paid upon the average profit for three years, and that was why it stood at so large an amount. As long as the mine paid its own expenses it should be kept going, for there was no question but that several of the mines would have to shut up, and the production being on that account reduced they might expect the value of the lead to rise

The CHAIRMAN said Mr. Wilde had satisfactorily answered Mr. Hurst's questions. He might add that it would be very difficult to get anyone to purchase the mine, for the reason which made the company anxious to sell would deter other people from buying.

The motion for the adoption of the report was then put and carried unanimously.

The retiring directors and the auditors having been re-elected, the proceedings terminated with a hearty vote of thanks to the directors and staff.

THE ALAMILLOS COMPANY, LIMITED.

The sinking of Judd's shaft.

The half yearly general meeting of the Alamillos Company (Limited) was held on Thursday, at the offices of the company, 6, Queen-street-place, the chair being occupied by Mr. RICHARD DONAGAN.

The SECRETARY (Mr. Henry Swaffield) read the notice convening the meeting.

The CHAIRMAN: Gentlemen, it now devolves on me to move the first resolution—viz., "That the report and accounts be received and adopted." In the case of this company it is the same old story—too low a price obtained for our produce to allow of our making much show as the result of our operations for the half year. Still, we have made a profit of £572 14s. 7d., which is more than might have been expected under the circumstances, especially as it happened that on December 31 we had a rather larger quantity of stock on hand than that with which we began the half year, which had to be valued at a reduction, thus militating more against the actual difference between the proceeds and the cost of production than would have been the case had the stock on hand been the same in quantity at the end of the half year, as it was in the beginning. The profit, such as it is, has necessarily to be applied in the reduction of the amount standing to debit of profit and loss. This amount was £1052, and has thus been reduced to £479, being a reduction of more than one-half, and we hope on the next occasion not only to see this debit quashed, but also some credit balance in its place. The mines have not presented any startling features during the half year. The expenditure some time ago of £1000 from the reserve fund in further sinking Judd's shaft seems likely to open up some productive ground, as mentioned in the report, and, in addition to that, the draining of the shaft to the depth attained facilitated the sinking of certain winzes from the level above, which gave additional stoping ground. The present residue of the reserve fund is invested in the outlay made some years ago on the company's smelting works. If ever the profits of the company should be sufficient to allow of it, it may be prudent to act liberally in this matter of the reserve fund, and to invest the amounts so to be written off profits in Consols, for, however expedient and advantageous it may be at the time, it certainly does impair the subsequent utility of a reserve fund to have it tied up in an inconvertible way. In the meantime it should be recollected that in addition to a larger stock for realisation at the end of the half-year than we had at the beginning, the accounts before you show money on deposit at the bankers, besides a fair balance on current account. The reserves of ore, it will be seen, remain the same as on last occasion, so that the ground laid open by the six months' working has kept pace with the extraction. Mr. Taylor will kindly give us his views regarding the mines, and I do not think I have anything more to say except to express the hope that sooner or later we may get better value for our product.

Mr. E. L. AGAR seconded the motion.

Mr. JOHN TAYLOR said it would be within the recollection of the shareholders who were present at the half yearly meeting held in autumn, 1891, that he then explained the reasons for the proposed sinking of Judd's engine shaft to a greater depth, and the desirability for adopting the suggestion for withdrawing £1000 from the reserve fund to meet the cost of that work. The sinking of that shaft had been discontinued at the 70 fathom level, for the lode there had become disordered. The 70 fathom level had been driven away from the shaft some little distance, and in several winzes sunk below it good paying shoots of ore had been followed down. Now that these could be worked at a profit if they were taken in hand in

proper, minerlike manner was evident. The only way to effect this was by sinking the shaft for 30 fathoms and driving levels underneath these known ore shoots. That work had been done, and the 100 fathom level had been driven on both portions of the lode, and recent reports spoke certainly more favourably of this western mine. The 100 fathom level west had been, and continued to be, worth about 2 tons of lead to the fathom, and the eastern level had quite lately improved to 1½ ton. Both were opening up good stoping ground which would give a profit even at the present price of lead. There were not, he thought, any other points in the mine which called for special remark. There could be no doubt that if only they got a reasonable price for the lead they would be able to make fair profits.

Mr. WILDE enquired whether it had occurred to the management to adopt any of the improved boilers which had been recently invented to decrease the consumption of coal. He also wished to suggest that the amount taken from the reserve fund to carry out certain works should be written off from that fund.

The SECRETARY said that this point had come under the consideration of the board that morning, and they had decided to carry that suggestion into effect.

Mr. FRANK TAYLOR said that the boilers in use at the mines were as economical as possible. They used Cornish boilers, and he did not think there was any yet invented which could improve on them in decreasing the coal consumption. Mr. Tonkin had expressed a strong view in favour of Cornish boilers.

The retiring directors and the auditors having been re-elected, the meeting terminated with a cordial vote of thanks to the directors and staff, proposed by Mr. WILDE.

SIERRA BUTTES GOLD MINING COMPANY, LIMITED.

A cautious and successful policy.

The 48th ordinary general meeting of the shareholders of the Sierra Buttes Gold Mining Company (Limited) was held, on Thursday, at the Cannon-street Hotel, the chair being occupied by Mr. TENDRON.

The SECRETARY (Mr. John Saul) read the notice convening the meeting.

The CHAIRMAN said: Gentlemen, if you look at the accounts of the Sierra Buttes Company you will see in the profit and loss a charge of $5053 for extraordinary expenses, and you will see the same charge in the profit and loss account of the Eureka. Those extraordinary expenses, amounting to about £2100, were the charges we were put to in connection with two mines, of which we had obtained bonds, the Columbus and the Keystone Mines. They were small mines, and we had not any forfeiture to pay. The properties were handed over to us to see what we could make of them, and after working for some time we found they did not hold out sufficient inducement for us to continue working, and, therefore, we gave up the bonds and sacrificed our labour and outlay to that extent. I don't regret the amount in the least. It is impossible for us to secure good mines unless we incur a certain amount of expense in examining properties. Altogether we have had over 40 mines offered to us, and out of the whole of those we only considered four or five worth examination, and four out of those five turned out unsatisfactory, and the Uncle Sam Mine alone turned out well, and that amply repaid us for the expense we incurred in examining the others. We still hold a bond on the Whitlock Mine, to which I will refer later on. With regard to the Buttes, after providing for this £1050 out of the profits of the half-year, we still had £1171 left, and that, added to its moiety of divisible profit, enables us to pay you the usual dividend, and to carry forward nearly £2000, which we have now placed in the reserve fund. Some three years ago I led you to expect that we might bring the reserve fund, which then stood at £11,000, to a sum that would enable us to provide its portion of a new property, if we had an opportunity of purchasing one, and that policy has been so steadily carried out that at the present time you have a reserve of £17,500, and the increased value of our securities close upon £900. Altogether, we can lay our hand on about £22,500. (Cheers.) How long we shall be able to continue laying money by in this way I cannot say, because during the last three years we have been expecting every six months to hear that no more payable ore can be found. We are living on ore left behind by those who worked the mine at the time it was prosperous. I hope in July to visit your mines in company with Mr. Saul, and when I meet you in October perhaps I may be able to tell you whether there is any hope of laying open the ore in the upper levels at the old Buttes Mine. At the Eureka Mine we are living on such small bodies of ore as we can develop in what we call the outside mines, which are a series of flat veins. You see that during the past half year, after paying the £1050 to which I previously referred, there was still a profit of £861. Add to that the moiety of divisible profit from Uncle Sam, and also the interest on investments, and we are enabled to give you the usual dividend and to carry forward a small balance. The enhanced value of reserve fund on the Eureka is no less than £5000. (Cheers.) Taking the securities at the market value of yesterday, and the Eureka has close upon £55,000 that we can lay our hands on almost from one day to the other if we have an opportunity of investing that money wisely and well—(cheers)—and, if not, we will return a portion of it to you, not as dividend, but as something towards the original amount you put into these companies. Although the directors do whatever they can towards the prosperity of the company, it is perfectly hopeless to think they can by buying new properties replace the whole of that capital, but if your shares instead of being £2 had been £1 shares, and anything like good fortune had attended the efforts being made by Mr. Johns and Captain James, I should not be surprised to see your shares approach at all events the value of £1 shares. The Uncle Sam Mine has, as usual, a good record for the half year. It has crushed the usual quantity of stuff—about 10,200 tons, and the average value has been 41s. 8d. per ton against 41s. 6d. for the whole period since we commenced working. The ores run wonderfully steadily, thanks to the skill of the mine captain in taking out the ores from various parts of the mine in a way to maintain an average return, and the working cost for the half-year, including London expenses, has been 22s. 7d. as against 23s. 8d. for the average of the whole period. The total value of the gold taken out of the mine since January, 1889, is £142,800, the profit on that being £60,604, of which £12,302 was appropriated for development, £8000 carried to reserve account, and the shareholders have divided between them over £40,302. (Cheers.) That on a property which cost £32,000 is, I think, highly satisfactory. We have two veins at the Uncle Sam—the north and south veins. The north vein is not a large one, but its ores are of rather a high quality. There are still some good reserves, but no new developments. There is still enough ore in the north vein to last some time. There are no new developments taking place at the south vein—at least so far as the eastern portion of the mine is concerned. There are some good reserves there, but they do not seem to find these ore-bodies to the same extent in depth, nor have they been able, up to the present time, to find any new ore-bodies, and they do not write very hopefully about it, but seem desirous of concentrating their attention more on the western part of the mine. There are three shoots in that portion of the mine. The first is about 220 feet long, the second about 245 feet, and the third is 178 feet. You can judge from the amount taken out of the shoots that there must be very large amounts of reserve for the future, and so long as they can sink without meeting with water there is reason to hope that the shoots will go downwards, and that they will lay open still further bodies of ore. There are certain developments we can rely on, and others we can only hope to be able to make. I pass on to say a few words about the Whitlock Mine. If we have been unsuccessful in some of the new mines we wanted to develop, I hope we may succeed in the Whitlock in doing something more than recoup the outlay we have made. The mine was worked some 20 years ago by means of a tunnel driven some 400 feet through the rock, and then by means of a level passing through the body of ore, altogether about 800 feet in length, and a shaft sunk on the slope of the vein for about 200 feet. As it would take considerable time to open out the tunnel and level, we required a longer bond than usual, and we had a bond granted to us for nine months on terms we considered satisfactory. There was to be no forfeiture except for labour, and the price was fixed at what I should call a very fair sum for both parties—$100,000. We have opened out the tunnel again and have driven all along the level, have examined the ore, put an engine in to pump out the water, and have gone on sinking the shaft. The rock and vein have been hard, and the sinking has been much slower than was anticipated. We have been only able to get down to a depth of 163 feet. Of course, the whole body of ore from this lower level up to the level the old workers have driven is intact, and will represent so many thousand tons, while there is also a large quantity of ore left behind by the other workers. This is good ore, and runs from $10 to $12 on an average. The expenses are rather heavy, because besides the hardness of the rock, the water supply is unsatisfactory. The mill would have to be placed four miles away, and a tramway built to carry the ore. With all these considerations, we have arranged that Captains James and Jenkins shall meet and carefully consider what the cost of working will be. I think I have now dealt with all matters respecting the mines you possess, and the mine you will probably possess, and I will conclude by moving the adoption of the report and accounts.

Mr. WRIGHT seconded the motion, which was carried unanimously.

Resolutions submitted from the Chairman, authorising the payment of a dividend of 6d. per share on the Sierra Buttes shares, and one of 9d. per share upon the Plumas Eureka shares, were then adopted.

The retiring directors having been re-elected, the proceedings terminated with a hearty vote of thanks to the board.

WHEAL METAL AND FLOW.

Waiting for a rise in tin.

A general meeting of the shareholders in Wheal Metal and Flow was held on Tuesday, at the offices of the company, Nos. 14 and 15, Broad-street-Avenue, the chair being occupied by Mr. J. H. COLLINS.

The accounts contained the following items:—Debtor: Cost to March 10th (16 weeks): Agency, engineer, and management, £58 16s.; mechanics and enginemen, £65 12s. 1d.; tutwork, £43 2s. 6d.; dressing and surface labour cost, £199 5s.; tramming and cartage, £69 6s. 10d.; merchants' bills, £250 16s. 3d.; petty bills, travelling, rates, printing, postage, and sundries, £45 13s. 2d.; secretary and offices, £21; rent and royalty, £31 11s. 11d.; less royalty remitted, £7 2s. 2d.=£24 9s. 9d.; bankers' charges for half year ending 31st December, 1893, and discounts on tin bills, £24 15s. 1d.; discount on calls, £10 7s. 9d.; C. B. Parry, special vote, £15 15s.; total, £828 19s. 5d.; balance, as above, £312 10s. 9d.; liabilities over assets, November 25th, 1893, £501 2s. 8d.; balance, assets over liabilities (nominal), £206 3s. 7d.; grand total, £1019 17s.—Creditor: By sales of tin ore, £510 14s. 2d.; relinquished shares account, £5 14s. 6d.; balance, £312 10s. 9d.; total, £828 19s. 5d.; by call of 3s. on 6799 shares, December 13th, 1893, £1019 17s.

The SECRETARY (Mr. G. E. Collins) read the notice convening the meeting.

The CHAIRMAN said: Gentlemen, the managers' and agents' reports have been sent to you, but it might be worth while for me to read them. The managers report that:—

> During the 16 weeks we have sold 1½ tons of tin less than during the last similar period. This was caused by the lower quality of the sand first washed down by our new arrangements and hauled up by the incline tramway. Of course this is only a temporary falling off; moreover, the lower output was counterbalanced by lower labour costs, so that the cost per ton of tin raised was about the same. The merchants' bills are somewhat higher than usual, owing partly to the materials used for the incline tramway, partly to the high prices for coal then ruling. But the main cause of our loss, it is hardly necessary to point out, is the low price of tin from which we are suffering in company with every other mine in the county. The average price realised was only £35 per ton, as against nearly £47, the average previously realised during the company's working. At such a price we do not think that the Flow can be made to pay for steam working; and after consulting with several of the larger shareholders, and with the consent of the lord's agent, we reluctantly decided to stop the engine and discharge most of the hands employed. The Bleu bridge and Trelissic floors we have let on tribute, the nett returns from which we hope will cover our now small standing charges until the state of the tin market improves. The engine and other machinery have been carefully protected, and we hope that we shall find, on re-working that they will have but slightly depreciated in value. It will be seen that the lord has granted some relaxation in the matter of royalty; the relief in this respect amounting to £7 2s. 2d. during the present period.

The Agent (Mr. Stephen P. Curtis) writes:—

> Since the last meeting of the shareholders the intermediate level has been extended about 10 fathoms, and in that drivage the lode at times produced a little tin, but at present it is disorganised. We have completed laying down the incline tram to foot of Flow, which worked well. We have also constructed hatches and built them in place, and washed down from top of Flow a quantity of sand for the incline tram. On March 10 I was instructed to stop all steam operations, since which time I have boarded the windows of the engine-house, smith's and carpenter's shops, drained the boilers of water, painted the engine, taken up the rails of the horse tramroad, and various other work. I am now carrying on the dressing of tin at Bleu Bridge and Trelissic on tribute.

I have not much to say as to the position of affairs—in fact, it speaks for itself. We are simply marking time, while waiting for an advance in tin. I cannot pretend to prophecy on this question—I wish I could—but I have seen as bad times before, and twice since then black tin of good quality has sold for £100 per ton. I rely on the truth of the old proverb, which says that when things come to the worst they will mend. They seem to have begun to mend, for tin has gone up about £4 per ton from its lowest, and we must now live in the hope that the mounting process will continue. I now move that the report and accounts as presented be adopted, and will ask some shareholder to second this, and then invite your remarks thereon.

Mr. F. DENNY seconded the motion.

The CHAIRMAN: With regard to our sales of tin, our sale in February is the lowest it has ever been at the mine. It only yielded £32 worth per ton. In March we got £35, and for a further little sale by tributers we have got £38 2s. 6d. If that improvement goes on we shall soon find ourselves in a different position.

Mr. SIMMONS: Was it necessary to take up the tram rails?

The CHAIRMAN: It is the old horse tramroad which we are not going to use any more. Instead of having this tramroad, which goes a long way round the side of the Flow our new tramway goes right up the bottom, and then we have an incline to pull the stuff up to the engine. It works very much cheaper. We have some tons of good rail iron, and we were rather afraid it might have got stolen bit by bit, and we thought we would take it up and store it in the boiler house. We have had an offer to purchase it, but I don't want to sell it. I think we shall want it one of these days.

The motion for the adoption of the report was then put and carried.

Mr. SIMMONS enquired whether it might not be advisable to make another call in order to clear off all outstanding liabilities.

The CHAIRMAN said he should advise waiting for some time in order to see how things turned out. There were some doubtful assets, which might or might not produce something. There was no real necessity to make a call to-day.

Mr. SIMMONS: According to the accounts there has been an increase in the liabilities.

The CHAIRMAN: That is perfectly true.

Mr. SIMMONS: I do not want a call if you can do without it, but I was thinking whether it was necessary. You must be the best judge of that.

The CHAIRMAN: I should advise leaving it. It would be a good thing in some ways to make another call, but I think we had better get in the call we have already made, and perhaps at the end of that time our affairs will not look quite so bad.

Mr. SIMMONS: We are not working underground at all now.

The CHAIRMAN: No; the lord has permitted us to stop working underground altogether.

Mr. SIMMONS: According to the original lease we were obliged to keep a certain number of men underground.

The CHAIRMAN: If they chose to insist upon it. There is no doubt that if we had quite a small capital, working underground at Wheal Metal is the best speculation open in Cornwall. But it is a matter that certainly does require a few thousand pounds. We have not had the capital to do anything to speak of.

Mr. SIMMONS: How long will the sand last us?

The CHAIRMAN: There is a great quantity of sand left.

Mr. SIMMONS: Has it been sampled, to see if it all contains tin?

The CHAIRMAN: We have not found any that does not contain tin. All we have treated has yielded 10 pounds of tin to the ton. If tin goes up to any reasonable price our arrangements are far better than they were before. We can deal with sand more cheaply than ever before, but it was no use going on with tin at £32 a ton.

Mr. SIMMONS: It depends now on what tin is going to be. If it remain down where it is at present, not half the mines in Cornwall will be able to go on.

The CHAIRMAN: I don't think five mines in Cornwall will pay their way with tin at this price—certainly not more than five.

The proceedings then terminated in the usual manner.

DOLCOATH.

Dividend of 12s. 6d. per share.

A 12 weeks' meeting of the shareholders of this mine was held on the mine, on Tuesday morning, Mr. M. H. WILLIAMS, J.P., C.A., presiding.

Captain JOSIAH THOMAS, the manager, read the statement of accounts, which showed that the expenditure for the past three months had been: Labour, £12,774 11s. 7d.; tribute, £1684 10s. 6d.; merchants' bills, £6105 17s. 5d.; Camborne and Illogan parish rates, £377 14s. 2d.; miners' hospital, £25; Stannary dues, £26 13s. 10d.; total, £20,994 7s. 6d. The receipts were: Black tin sold, less dues, 617 tons 1 cwt. 1 qr. 24 lbs., £24,908 12s. 9d.; extra carriage of tin, £85 13s. 10d.; discounts, £42 12s. 8d.; tribute debts, £40 3s. 2d.; total, £25,077 2s. 5d.; showing a profit of £4082 14s. 11d. on the four months' working, which, with a balance from last account of £4669 4s. 7d., made a balance in favour of the mine of £8751 19s. 6d.

Captain JOSIAH THOMAS read the following report:—

> The engine shaft is sunk 10 fathoms below the 425 fathom level on the north part of the lode which produces low quality tinstuff. A better part, as seen at the 425, is probably standing to the south, which we cannot conveniently cut through until the next level is reached. The 425 west of Old Sump shaft is worth £10 per fathom. We shall this week commence to sink New East shaft below the 425, where the lode is worth for 9 feet long £50 per fathom. The 425 east of New East is driven 15 fathoms east of No. 1 winze. The lode for the whole of that distance has been worth for 6 feet wide from £20 to £100 per fathom, which is about the value of the present end. We have opened on the lode at the 425 near the winze for a width of 26 feet, but the south wall is not yet reached. The 412 west of Old Sump is worth £10 per fathom. The 412 east of New East has been worth £25 per fathom for the last 10 fathoms driving. This end has now reached the crosscourse, and we shall at once commence to drive north towards the eastern shaft, which is sunk 15 fathoms below the 400 fathom level. We expect to hole the 412 to the shaft in about two months, soon after which we shall be able to draw tinstuff from that level. The 338 west of Harriett's shaft is producing a little tin. The 314 west of Harriett's shaft is also producing tinstuff of low quality. The winze under the 327 west of eastern shaft is sunk 6 fathoms, and is worth for 9 feet long £45 per fathom. The 302 west of eastern shaft is producing a little tin, but is not yet of much value. We are expecting an improvement in driving further west.—South lode: The 375 west of Harriett's shaft is producing a little tin. The 338 west of Harriett's is not of much value. The 327 west of winze west of eastern shaft is worth £25 per fathom. The 278 west of Old Sump is worth £10 per fathom. The 266 west of Old Sump is worth £15 per fathom. The 254 west of Old Sump is worth £18 per fathom. The 242 west of Old Sump is worth £10 per fathom. The 220 east of crosscut south of engine shaft is worth £10 per fathom.

The CHAIRMAN, in moving the adoption of the report and statement of accounts, said that they must all regret that such a quantity of tin had been sold for so little return. Here they had one of the largest tin mines in the world, producing such a large quantity of tin, while the price of tin was merely nominal. Tin had been sold at something like £2 12s. 6d. less than in previous years, whereas if they had got the same price as they obtained two or three years ago the amount realised would have been something enormous. The mine was never richer than it was at the present time, therefore it was only a question of the price of tin. With every little rise made in silver up went tin 2s. 6d. or 5s. per ton, which went to show that silver had something to do with the price of tin. (Hear, hear.) They had seen that for the last fortnight silver had been gradually rising, and tin was better than it had been. What would put up the price of tin? Perhaps the smelters could show better than he could, but this he could say, that their great outlook for tin was America. America, before the additional duty was put on tin, took all the tin they could possibly put out. The Welsh platers put out all the tin they possibly could, and what had been the effect? The effect was that half the works in Wales were closed, and had been idle ever since. But that was a thing which would work itself out and find its level. The enormous quantity of tin stocked by the Americans would be reduced, and they would have to come to them again for tin. Then they might hope that the Welshmen would be able to re-open their works, and that there would be a greater consumption of tin than there had been in the past. He moved that a dividend of 12s. 6d. per share, free of income tax, be declared. (Applause.)

Captain RABLING seconded this, and it was unanimously agreed to.

Captain THOMAS supplemented his report by saying: You will see by the statement of accounts we have had largely increased returns of tin during the past quarter, having sold 140 tons more than last. It was somewhat difficult to determine what was the best course to be adopted in working the mine with the low price of tin that prevailed. The matter was discussed very fully in committee, and we came to the conclusion that, taking all things into account, it would be best to continue working the mine just as usual, for if we lessened the cost and decreased the returns by dismissing one or two hundred hands it would be a very serious matter for the workpeople, and also for the inhabitants of the neighbourhood. (Hear, hear.) On the other hand, we did not deem it prudent to curtail the exploring operations or stop working the ground of a moderate value, and break a much larger proportion of the richer ground. We have, therefore, gone on sinking shafts and driving the various levels at full speed, employing no less than nine boring machines, making no special efforts to raise an increased quantity of tin. If we had determined to do so we could have raised considerably more than we have done. I hope the course we have adopted will commend itself to your judgment as the best that could have been taken under the circumstances. The average price of tin this quarter is £2 14s. 3d. per ton less than last, so that if we had only the price of last quarter—which we then thought was very low—we should have made a profit of nearly £1700 more than we have done. Our cost this time is more than last. With the lessened return last time we kept the cost in every department as low as possible, but, although we have raised 140 tons of tin more than last of the value of nearly £6000, the cost only increased about £1000. The prospects of the mine for the future are exceedingly good. We are opening up a lode in the bottom level east which I believe is unparalleled for size and richness in the history of Cornish mining. (Applause.) We do not yet know how wide the lode is. We have cut into it now for a width of 26 ft., and have not yet reached any granite in the side. I may say the average produce by numerous samples of the whole of that 26 ft. is about 1½ cwt. of tin to the ton. The north part of the lode on which we are driving is considerably richer than this even. The 425 end is now 10 fathoms short of No. 2 winze, where the lode at the 412 is richer than it was westward, and 120 fathoms short of the eastern shaft. We have made good progress in sinking the engine shaft during the past three months, having sunk 5 fathoms, and the shaft is now 10 fathoms deep. About the time of the next account I hope we shall have commenced to drive another level from the engine shaft about 15 fathoms below the 425. The 412 east will be holed to the eastern shaft in about two months, and we intend to drive a level

west from that between 327 and 375—that ground being unexplored—a hundred fathoms in length. We shall then lay open the ground for working in the 327, both on the main and south lodes. I should like to remind you that every pound rise in the average price of tin for the quarter will give us on our present returns an additional 2s. 6d. dividend. I congratulate you, those of you who have stuck to the mine through evil and good report, on the splendid property which you now possess, and I have much pleasure in assuring you that we are opening a considerably larger amount of tin than we are taking away.

Mr. H. P. VIVIAN asked a question in regard to the relative cost of Californian and Cornish stamps, and as to whether the Californian stamps crushed more ground than the Cornish one?

Captain THOMAS replied that he gave a full and complete account of these stamps in a paper read by him at Truro before the Royal Institution a few months ago, in which he stated that the Californian stamps would do about twice as much as the old Cornish stamps. He might say that they had been thinking for some months past of erecting stone breakers and proper appliances for breaking the stone smaller, instead of breaking it up by hand labour, but the low price of tin had rather hindered them from laying out additional money. He thought the work could be done for £500 or £600, and might pay for itself about 12 months' time.

Mr. D. W. BAIN, J.P., proposed, and Mr. J. MAYNE seconded, a vote of thanks to the Chairman, which was heartily accorded, and the proceedings then terminated.

TINCROFT.

Dividend of 2s. per share.

A 16 weeks' meeting of the shareholders was held on the mine on Tuesday, Mr. FRANK HARVEY, J.P., presiding.

The statement of accounts were read by the PURSER (Mr. F. W. Dabbs) and showed expenditure:—Labour cost, £7953 2s. 7d.; merchants' bills, £3162 11s. 7d.; Vice-Warden's assessment, one quarter, £9 4s. 9d.; income tax on one year's profits and dues, less £140 charged last account, £65 8s. 1d.; bankers' charges, half year, £49 5s. 7d.; one year's subscription to Mining Association, £2 2s.; ditto to Camborne district nurse fund, £2 2s.; ditto to West Cornwall Miners' Hospital, £21; Employers' Liability Corporation (Limited), one year's premium less £63 16s. 10d. received since last account, £52 18s. 2d.; doctors to April 7th, £94 7s. 10d.; club to same date, £34 18s.; dues to Lord Robartes, £303 12s. 8d.; total, £11,752 14s. 6d. The receipts were by copper ores sold, 168 tons, £538 2s. 5d.; by arsenic sold, 115 tons, £993 18s. 6d.; by tin ores sold, 276 tons 0 cwt. 0 qr. 5 lbs., £10,448 1s.; by slime tin sold, 11 tons 2 cwts. 3 qrs. 27 lbs., £368 5s. 11d.; by discounts, £97 1s. 3d.; by carriage of tin ores, £7 11s. 5d.; by Carn Brea Mine adventurers—part of Tobroadden adit repairs, £18 15s.; total, £12,371 15s. 6d., thus showing a profit of £619 1s., which with the balance of £2264 1s. 8d. from last account, makes a favourable balance of £2884 2s. 8d,

Captain WILLIAM TEAGUE presented the following report of the agents:—

Highburrow Lode: Martin's East Shaft is complete to the 330 fathom level—top and bottom plats cut. We shall now commence to drive the south cross-cut forthwith, and hope to cut the lode during the next four weeks. In the 320 fathom level east of Martin's East Shaft, the lode is worth for tin £20 per fathom. We have suspended this end for the present in order to put up a rise, which is now up about 5 fathoms; the lode is worth for tin £18 per fathom. In the winze sinking below the 320 fathom level, west of cross-cut west of Martin's East Shaft, the lode is worth for tin £16 per fathom. In the winze sinking below the 320 fathom level, east of Harvey's Engine Shaft, the lode is worth for tin £12 per fathom. In the 320 fathom level, west of Downright Shaft, the lode is producing saving work for tin. In the 212 fathom level, driving west of Downright Shaft, the lode has been very regular in its value for the last 20 fathoms driving, being worth for tin £15 per fathom. North Tincroft: Willoughby's Shaft is down to the 164 fathom level, and we have commenced to drive east; at present the lode is disordered. In the 164 fathom level, driving west of Willoughby's Shaft, we have communicated from No. 3 to No. 2 winze; the lode is large and highly mineralised throughout, being worth for tin and arsenic £25 per fathom. In No. 1 winze sinking below the 164 fathom level east of Willoughby's Shaft, the lode is large and worth for tin and arsenic £15 per fathom. In the 120 fathom level, driving east of Willoughby's Shaft, the lode is worth for tin £12 per fathom.

Captain TEAGUE said he considered the 212 driving west of the Downright Shaft was an important discovery. The next important part is the expected cutting of the lode south of Martin's east in four weeks' time. North Tincroft continues to yield the usual quantities of copper and arsenic, and they would be glad to know they had let a 12 months' contract for arsenic at £10 a ton—(applause)—so will raise as much as possible. There was industry and economy to get such good results. The stuff is raised at considerably less than 4s. per ton. Exploration work is progressing the same as when tin was £100 a ton. If tin goes up, of course the shareholders will benefit.

Mr. HARVEY, in proposing the adoption of the accounts and report, said it was disappointing that tin should have dropped £4 a ton; yet they had more for copper and arsenic, and results were better than they might have expected. He thought the staff deserved credit for their labours.

Mr. HEARD seconded.

In reply to Mr. MAYNE and others, Captain TEAGUE said they did not drive more than 9 feet west from the Downwright Shaft when they cut the lode, and it had produced 47 lbs. of tin per ton.

The accounts, &c., were adopted, and a dividend of 2s. per share unanimously agreed to. The proceedings terminated with a hearty vote of thanks to the Chairman.

CARN BREA.

Loss of £234.

A 16 weeks' meeting of the shareholders was held on the mine on Tuesday, Mr. FRANK HARVEY, J.P., in the chair.

Mr. JOHN TREVETHAN, the purser, read the accounts, which showed the labour costs to have been £11,129 6s. 11d.; merchants' bills, £4293 8s. 11d.; doctors' pence, £142 14s. 1d.; club, £68 11s. 4d.; Tehidy estates—dues, £171 6s. 1d.; ditto omitted last account, £130 16s. 8d.; income-tax, £283 12s. 6d.; Employers' Liability Company, £45 0s. 11d.; Camborne District Nurse Fund, £3 3s.; Cornish Bank (Limited), interest, commission, and cheque books, £85 18s. 4d.; Vice-Warden's assessment—six months, £26 4s. 1d.; West Cornwall Hospital, £26 5s.; total £16,349 5s. 10d. The income had been: By black tin sold, 394 tons 14 cwts. 3 qrs. 17 lbs., £15,448 6s.; by slime tin sold, 13 tons 18 cwts. 0 qrs. 10 lbs., £426 11s. 10d.; by arsenic sold 32 tons 7 cwts., £78 7s. 4d.; by sundries, £6; Employers' Liability Company (Limited), £55 2s. 8d.; discount off merchants' bills, £100 13s. 8d.; total £16,115 1s. 6d.; showing a loss on the 16 weeks' working of £234 4s. 4d. The balance from last account amounted to £1732 6s. 11d, and deducting the present loss from this leaves a balance of £1498 2s. 7d. to be carried to the next account. The ledger balance showed that the average weekly sales for the 16 weeks ending December 22nd, 1893, were: black tin, 25 tons 3 cwts. 1 qr. 9 lbs.; slime tin, 18 cwts. 3 qrs. 2 lbs., and for the 16 weeks ending April 17th, 1894, black tin, 24 tons 13 cwts. 1 qr. 50 lbs.; slime tin, 17 cwts. 1 qr. 17 lbs., a decrease of 9 cwts. 3 qrs. 17 lbs. of the former and 1 qr. 16 lbs. of the latter. The average price for December 22nd was £43 1s. 10d. per ton for black tin and £29 12s. 6d. for slime tin; and for April 17th, 1894, £39 2s. 9d. per ton for black tin, and £13 18s. 9d. for slime tin, an increase of £3 19s. 1d. on the former, and an increase of £1 1s. 3d. per ton on the latter. The average produce of black tin to the ton of stuff for the 16 weeks was 53 lbs. The difference in the average price obtained for black tin for the 16 weeks has made a difference of £1560 to the credits this time.

Captain T. WHITE, the manager, presented the following report:—

Highburrow West: Highburrow Lode: Highburrow west shaft is sunk to 5 fathoms below the 325 fathom level. We purpose driving the 325 end east as soon as possible, in which we have a large and promising lode. The rise in the back of the 310 fathom level west is up 4 fathoms. We hope to communicate this with the winze sunk below the 298 fathom level next month, when a valuable section of stoping ground will be made available, the winze for about 10 fathoms sinking being a lode worth from £15 to £40 per fathom. The lode in the 298 end west is worth £25 per fathom. We are expecting a further improvement in this end. About a fortnight since we communicated the rise in the back of the 298 fathom level west with No. 4 winze below the 285 fathom level. This has laid open a large section of productive stoping ground. We have seven stopes working in this part, of an average value of about £20 per fathom. Highburrow East: Harvey's engine shaft is forked and cleared to the bottom 328 fathom level, with skip road fixed and working to that depth. We have commenced to cross-cut south at the 322 fathom level to prove the lode south of the elvan. The lode in the rise in the back of the 310 fathom level east of Harvey's shaft is worth £12 per fathom. The lode in the winze sinking below the 285 fathom level east of shaft is worth £15 per fathom. We hope to communicate this winze with the 310 rise next month, when a section of stoping ground for 20 fathoms in height will be made available. The lode in the 298 end east of shaft is worth £10 per fathom. The lode in the 170 end west of north cross cut produces a little tin. We have seven stopes working here. Lode worth £10 per fathom average.—Old Sump: The lode in the engine shaft sinking below the 256 fathom level has slightly improved of late, and is now producing stones of tin. The shaftmen are engaged in fixing skip road from the 244 to 256 fathom level. At the 256 fathom level we have driven a cross cut south 10 fathoms, and cut a lode 3 feet wide, with a slight underlie south; this will probably form a junction with Teague's lode at the next level—the 268. We consider this an important point. The lode in the 256 end east of cross cut in new lode is worth £10 per fathom. The in the winze in bottom of 244 fathom level east on Druid's lode is worth £9 per fathom; in the 244 end east on Druid's lode £10 per fathom. The lode in the 244 west on Teague's lode is worth £10 per fathom. The lode in the 232 end west on Teague's lode is worth £11 per fathom. We have six stopes working in this part of the mine, worth on an average £8 per fathom. The new compressor engine house is built and covered in, and the engineers are erecting the engine, which will be put to work as soon as possible. We consider the future prospects of the mine to be good.

Captain WHITE added that during the past quarter they had had great difficulties—the greatest being the price of tin. They always tried to give satisfaction to the shareholders. From 1890 to 1894 they had divided £82,500 or £13 15s. per share. With reference to the prospects of the mine he saw no reason why they should not open up a great mine in the Highburrow part, and he was of opinion that that would be the case. At the old sump they were sinking and doing the best they could in order to meet with the junction of Druid's and Teague's lodes. In order to satisfy themselves upon that matter they had driven a cross cut south at the 256 and cut the lode, but they found that the lode instead of going north, its natural underlie, was underlying south, and consequently would make a more valuable junction than if it were underlying north. He thought they would have to sink another lift before that junction took place.

The CHAIRMAN, in proposing the adoption of the report, expressed pleasure that the loss was not greater than it was. He pointed out that they had not credited the mine with the sale of any tin further than the end of March, so that they had a fortnight's tin in hand, and really, so far as finances were concerned, they were in a very sound condition.

Mr. M. H. WILLIAMS, J.P., C.A., seconded the adoption of the report.

Captain WHITE said there was no mine in Cornwall had more assailants than Carn Brea, and it was a great satisfaction to him when he could open a newspaper without finding an attack on the mine by somebody. In reply to Dr. Permewan, he said that the had already adopted a two-thirds tribute at Carn Brea, and were prepared to give every encouragement to tributers, but he should never sanction the mixing of tributers with tut men.

The statement of accounts and report was then adopted.

WHEAL AGAR.

Works vigorously proceeding.—The coal question.

A 16-weeks' meeting of the shareholders in Wheal Agar was held yesterday at 2, Draper's-gardens, the chair being occupied by Mr. CORNELIUS BAWDEN.

The CHAIRMAN summarised the accounts, which upon the debit side contained the items of labour cost, £3681 10s. 9d.; merchants' bills, £1891 2s. 5d.; and banker's charges and Stannary assesment, £84 6s. 4d., giving a total of £5656 19s. 6d. Upon the other side the principle item was black tin sale, £3156 6s. 4d. The Chairman regretted the balance against the company, and deplored the very low price of tin. Authorities said there was going to be a rise in the future, and the only thing they could do was to hope for it.

The Captain of the mine, Mr. W. HAMBLY, read the report of the agents as follows:—

In the past two months we sunk Robartes's engine shaft on the new north lode 9 feet below the 320 fathom level, and cut the ground for the tramroad in the north side of same, also laid down the road in the western level from shaft to the present end, and cut the trip or bottom plat. The shaft is also the required depth for fixing bearers and cistern for drawing lift; this and other work, such as completing the double skip road to the bottom will be urged on as rapidly as possible, for the purpose of continuing the sinking of the shaft on the line of the lode, which is masterly in size and well defined, composed of quartz, chlorite, and a little sulphuric mundic; there is at present a strong spring of hot water welling up from the bottom and south side of shaft; this no doubt is proceeding from the great (or Waddington's) lode, which is in conjunction with the new north lode at this, the deepest point reached, and thus increasing its size and yield. However, the part carried out for width of shaft (3 feet) and length (12 feet) is worth £40 per fathom. The lode is in every respect most promising, and justifies us in saying from its size, character, and underlie that either of the branches or lodes falling into it from the south will without doubt still further increase its yield for tin and enhance its value. The 320 fathom level is extended 6 fathoms east of shaft, and for that distance the lode is worth £9 per fathom. The 320 fathom level is advanced 12 fathoms west of shaft. Lode full size of end and worth for tin £10 per fathom. A stope in the back of this level is worth for tin £12 per fathom. The 312 fathom level is driven west of cross cut 5 fathoms, or west of winze 6 feet (the winze referred to is that which was communicated with the rise in the back of the 320), thus opening up this section of ground, the value of which we have previously quoted. The ventilation of these points have proved a great boon for the development of the bottom of the mine and facilitating the breaking and discharge of stuff.—Great or Main Lode: At the 285 by the drivage of a short cross cut south the run of tin ground has been intersected; this point is worth for tin and arsenic £10 per fathom.—Stopes on Main Lode: No. 1 stope in the bottom of 255 worth £13 per fathom. No. 2 stope in the bottom of 255 fathom level worth £11 per fathom. Stope in the bottom of 245 fathom level east of No. 3 crosscut worth £12 per fathom. Notwithstanding the promising character of the lodes in 285 and 276 ends east, we deemed it advisible under existing circumstances to discontinue the drivage, until we have opened up some other points from which we trust profits may accrue, and thus enable us to resume operations there and elsewhere, without drawing from the shareholders. We have 13 tribute pitches at work in different parts of the mine, by 41 men, at an average tribute of 8s. 10d. in the £. The machinery underground and at surface is in good condition, and working well. The dressing appliances we are getting in a better state as opportunity offers. The prospects of the mine continue to be fairly good, and as regards the points of interest now reached in the bottom of Robartes's engine shaft, no time will be lost in fixing the lift and carrying out the other preparatory work for the purpose of opening up the mine at a greater depth than at the present, where we have reason to believe an improved and more productive lode will be met with.

Mr. HAMILTON enquired whether the sinking of 9 feet in two months was not rather a slow rate of progress.

Captain HAMBLY replied that they had carried out other works as well as the 9 feet mentioned. In fact, the quantity of work carried out had been very considerable, and would compare favourably with that of other mines.

Mr. HAMILTON asked how much the tributers had contributed latterly towards the finances of the company.

Captain HAMBLY replied that they had contributed £209 per month for the last four months, and had broken about half the tin sold by the company.

Mr. HAMILTON thought the report was a great deal more favourable than the last one.

Captain HAMBLY: Yes; that is attributable to the fact that when we last met you had not this lode in the bottom, excepting the shaft they had just touched, and now we have 18 fathoms driven on the line.

Mr. HAMILTON supposed Captain Hambly had come to some idea as to the amount of ground they would be able to sink.

Captain HAMBLY replied that he would be delighted if they could sink 12 feet a month.

Mr. HAMILTON: Then it will take nearly six months to get down to where you will start another lift.

Captain HAMBLY said that was the very time they had reckoned upon for the work.

On the motion of Mr. L. HATTERSLEY, seconded by Mr. LENNOX, a resolution for the adoption of the report and accounts was carried unanimously.

On the motion of Mr. HATTERSLEY, seconded by Mr. HAMILTON, a resolution was passed authorising the making of a call of 7s. 6d. per share.

Mr. PARKER YOUNG drew attention to the charge made by the bank for the overdraft, saying he thought it excessive in view of the fact that they had every shareholder in the company as security. He would accordingly move a resolution empowering the committee to take into considerntion the whole of the banking arrangements, particularly the discount of the tin bills, and the interest charged on the debit amount.

Mr. LENNOX seconded the resolution, which was carried unanimously.

Some discussion took place as to the price the company were paying for their coal, which it was suggested was rather high.

Captain HAMBLY stated that the amount paid was rather higher than at the neighbouring mine, but the reason was that the company had no contract for its coal supply.

The CHAIRMAN explained that no contract was entered into in midsummer, because it was thought that the price of coal would go lower.

The proceedings then terminated.

SPECIAL CORRESPONDENCE:

COLONIAL AND FOREIGN.

OUR PARIS LETTER.

DEARTH OF SPECULATION.—QUIETUDE IN FOREIGN INVESTMENTS.—SOUTH AFRICAN SCRIP.—COAL MINING IN HUNGARY.—

ENTERPRISES that have anything of a speculative character are looked upon with a great deal of disfavour in France, and as all foreign undertakings are more or less hazardous, very little money has during the past few years been invested outside the country. Exception has been taken to one or two securities that were thought to leave an opening for failure, but when money was lost over Portuguese and Greek scrip, while English capitalists were making considerable profits out of the despised South African gold mines, investors began to get bewildered at their want of luck. This absence of results in foreign speculation is due to the fact that the money available for investment is held almost entirely by the public, who are more anxious to place their savings without risk than they are to increase them by precarious profits. Their knowledge of speculation is extremely limited; and if they were more credulous they would be an easy prey to the shady promoters. As it is, they have suffered so heavily from the numerous failures of enterprises in which French capital has been invested, that they are very suspicious of any attempt to secure money for foreign concerns, though they are susceptible at the same time to be led away by anything in the nature of a "boom." A great amount of money is accumulating in what is colloquially termed the "stockings" of investors, but as they do not like to have their money unproductive, they are at their wits' end to know what to do with it. One of the most popular forms of home investment are the Paris bonds, and Municipal loans can be subscribed for over and over again.

This anxiety to invest in home bonds to the exclusion of foreign scrip is causing a certain uneasiness among economists, who contend that the prosperity of France cannot be assured unless capital is invested abroad. All branches of industry, and the iron trade in particular, have been shut off from any connection with foreign markets by the prohibitive fiscal tariffs, and now that the productive capacity is far in excess of the home requirements, manufacturers are unable to dispose of their superfluous output abroad. It is urged that it would be quite easy to create a foreign trade, if only investors would pay more attention to the development of foreign markets. A serious effort was made some time ago to secure a larger connection with South America by placing buyers and sellers in direct communication, but this effort was not sufficiently backed up by French capital any more than it has been in the Eastern markets, and even in the French colonies. It is a notorious fact, for instance, that the coal mines in Tonkin are being worked with capital subscribed entirely by Hong Kong merchants.

Quite recently there was every prospect of Transvaal gold mines coming once more into favour. The heavy profits of the English companies had stirred the imagination of investors who seemed inclined to place money in this class of speculation. A trust company was formed to look after the interests of shareholders, and check the tendency, which seems irresistible, of being drawn into the vortex of gold mining speculation by a "boom." So far, this movement has not had any definite results, and gold mining shares upon the Paris Bourse are quiet. This, however, seems merely to be the preliminary of a more active investment in South African gold mining in the future. The public are only beginning to grasp the extent and richness of the Witwatersrandt reef, though even now they have not been able to entirely shake off the bad impression which they acquired during the numerous Transvaal failures. When once confidence is established it is likely that there will be quite a brisk demand for Randt scrip.

The coal deposits in Hungary are considered to be the most prolific in Europe. They are of very wide extent, and the fuel is of excellent quality. It is only within the past few years that they have been worked upon any considerable scale, and the results have fully justified the foresight of those French capitalists who subscribed nearly the whole of the money required in one or two of the most important undertakings. The opening up of these coal measures coincided with a remarkable expansion of the metallurgical and other industries in the country, and even with the active working that has been carried on it has been found impossible to keep pace with the increasing consumption. During 1893 the output of coal in Hungary was 3,600,000 tons, while 10 years ago it was only a little more than 2,000,000 tons. Notwithstanding this improvement in the home production there was a large increase in the imports of fuel, the greatest amount being obtained from Germany, which supplied 102,873 tons. It is expected that when the Hungarian mines are fully developed they will constitute a formidable rival to English coal in the Eastern markets. In the working of the coal mines in Spain a great deal of French capital has also been invested. The mines at Esera are in the hands of a French company, which has made a very satisfactory profit upon the past year, and in view of the advantages that are enjoyed by this industry, the success of the one company may be followed by the formation of others.

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LONDON: APRIL 21, 1894.

THE METALLURGY OF LEAD.

THE mining engineer in charge of a lead mine is usually content to concentrate his ore up to 60 or 70 per cent. Pb., and then hand it over for further treatment to his colleague in charge of a smelting works, This latter gentleman follows in the footsteps of his forefathers, and very satisfactorily succeeds in extracting the bulk of the metallic lead from the mineral confided to his care. If a proposed new process is submitted to his notice, his conservative turn of mind induces him to fight shy of it, and cling to difficulties which he knows how to tackle rather than venture upon so-called "improvements," of which he has probably had painful experience in the past. Mr. J. B. HANNAY, whose name seems familiar to us in connection with chemical research, is not, however, one of those men who can rest satisfied with statements supposed to be facts, and which have been handed down from generation to generation, for in his paper on "The Metallurgy of Lead," read at this week's meeting of the Institute of Mining and Metallurgy, he objects to the generally accepted equations used to explain the roast reaction process, viz.:— $PbS + 2\ PbO = Pb_3 + SO_2$, and $PbS + PbSO_4 = Pb_2 + 2\ SO_2$, and says:—"Amongst all the formulæ given in chemical works, and especially collected in 'Percy's Metallurgy' on the furnace reactions of these compounds of lead, there is not one which really expresses the truth." Although the edition of PERCY'S lead referred to by Mr. HANNAY was published 23 years ago, and one would think that, if wrong, the mistake would have discovered ere this, for the above equations are given as the basis of the roast-reaction process, yet in our latest works on metallurgy, authors seem to have clung to PERCY'S treatise for their chemical information, and not to have taken the trouble to verify or dispute the statements given. Mr. HANNAY, however, fearlessly attacks PERCY'S remarks, and throws down the gauntlet to all those metallurgists who adopt his views, and who will remember that H. O. HOFMAN, in his "Metallurgy of Lead," brought out in 1892, acknowledges that his chapter on the "Properties of Lead and Some of its Compounds" is condensed for the most part from PERCY'S 1870 edition, and that SCHNABEL evidently uses the same source in his "Metallurgy," published this year. Mr. HANNAY, at the commencement of his paper, first of all seeks to prove that sub-sulphides of lead exist, a matter which PERCY seemed to doubt. Many chemists, however, such as FOURNET and BREDBERG, have fully acknowledged the existence of these sub-sulphides while in BLOXAM'S Chemistry, 1890 edition, page 403, we find that "Pb_2S and PbS are obtained as semi-metallic masses by fusing lead sulphide with metallic lead." The specific gravity of both artificial and natural galena was re-determined by Mr. HANNAY, and found to be somewhat higher than that generally accepted. His experiments made it 7·7666 in comparison with 7·58 of recognised authorities. This difference is accounted for by the fact that galena becomes oxidised when in contact with water which lowers the specific gravity of the sulphide, and this action was avoided by Mr. HANNAY, by the use of benzine as a medium instead of water.

In order to explain the phenomena of the roast-reaction process, the author brings an oxysulphide to his assistance, and gives the equation:—$12\ PbS + PbSO_4 = 2\ Pb_2S_2O_2 + 2Pb + 9\ PbS$, but says that it is impossible to obtain this reaction rigidly true, an admission which sounds peculiar, coming as it does immediately after a criticism on PERCY, wherein Mr. HANNAY finds fault with that writer for stating that much skill is required to yield even approximate results to certain formulæ he had given. The oxysulphide referred to is volatile, and when it passes below red heat splits up into PbS and SO_2, the former being deposited under favourable conditions in small cubic crystals such as have frequently been obtained in metallurgical practice. When PbS and PbO were finely powdered, mixed in their molecular proportions, and carefully fused, Mr. HANNAY found that they yielded a steel grey homogeneous crystalline mass, having a composition of Pb_2SO; he says that the first reaction which probably takes place is $4PbO + PbS = PbSO_4 + 4Pb$, but that whenever some $PbSO_4$ is formed the black (PbSPbO) begins to accumulate; besides, the $PbSO_4$ is partly decomposed into PbO by the PbS, which passes into slag. According to the old formula, lead fume consists largely of $PbSO_4$, so that all one would have to do in order to obtain lead would be to place it back in the furnace with PbS. Mr. HANNAY says, however, that the reduction of lead in the reverberatory furnace is not due to oxidised compounds of lead, but to the fractionation of the mixture of lead and its sulphide, or what is in the liquid state sub-sulphurised lead. The whole operation may be summed up in the reaction $24\ PbS + 44\ O = 17\ Pb + 2\ (PbS\ PbO) + PbSO_4 + 2\ PbS_2O_2 + 17\ SO_2$, which would represent the best result obtained—viz., 66 per cent. of lead, 12 per cent. slag, 6 per cent. fume, but the slag often amounts to 14 or 16 per cent., and the fume to as high as 12 per cent. according to the nature of the ore. The compound PbS_2O_2 is very easily oxidised to sulphate of lead and sulphur dioxide. Those of our readers who are but little acquainted with mystic chemical symbols are doubtless anxious to know what practical results are to follow from Mr. HANNAY'S experiments, and how his discoveries are to be best utilised. He proposes in the last division of his paper to Bessemerize the molten galena in a basic lined converter, the air being blown both on the surface and through the molten mass, the object being to form a volatile sulphate of lead with about half the charge. The greater portion of the sulphate thus formed is returned to the lead, and air forced through to promote the reaction $PbSO_4 + Pb = 2\ PbO + SO_2$. The small quantity o lead left in excess of the reaction will be found to contain all the silver.

It should not be a difficult matter for other experimenters to repeat Mr. HANNAY'S researches with such modifications as may suggest themselves, with the object of confirming or otherwise the statements put forth. Any fresh information about the metallurgy of lead will be warmly welcomed, but we must remember that at present a principle is suggested that has not as yet been put into a practical form, and that before this can be done the details must be carefully worked out. One of the weakest points of the proposed system seems to us to be the difficulty of condensing the fume, and we anticipate that the practical smelter will require considerable evidence as to the loss which will probably arise from the fine sub-division of the products before he will abandon his old fashioned but fairly satisfactory processes. The paper on the whole presents many points of interest to the student of metallurgy, and is a welcome constitution to the literature on the subject. Metallurgists will doubtless criticise Mr. HANNAY'S work, and by so doing further elucidate the problem, so that although the paper may not directly bring about a reform in lead smelting, it is quite possible that it will indirectly assist to do so.

THE PALMAREJO MEETING.

WHEN we expressed last week our opinion in favour of the directors continuing in office, we did so from reasons which we anticipated would find expression at the meeting this week. It seems that that anticipation was well-founded, for not a few shareholders were of opinion it would be unwise to have an entirely new board, and thus lose the experience which the directors have acquired. It must be admitted—and quite an insignificant few do not admit it—that the present directors have been sadly unsuccessful in the past; that they have been unwisely extravagant; that they have carried out works which evidenced great lack of knowledge and judgment; and altogether have not displayed marked ability in their past management. But, as the Chairman remarked, it is easy to be wise after the event. It is one of the easiest things in the world to criticise and to find fault, but one of the most difficult to originate and manage successfully. Severe criticism, however, generally produces excellent results. In its case the end is very frequently justified by the means. We thought—and, of course, still think so—that it would have a beneficial effect upon the Palmarejo Board. To bring home to them their mistakes, their lack of judgment, and their imprudent expenditure, we thought would open their eyes and enable them to profit by the advice which the advisory committee and those who think with them think fit to tender. It is very natural to suppose that they would endeavour in the future so to act as to remove the opposition which now so strongly and fruitfully expresses itself. Not only the majority of the shareholders, but the committee themselves, see the force of this, and, therefore, do not recommend the wholesale clearance of the present Board. They advise, consequently, the introduction of two or three new members, and the retention of one or two of the present directors. The meeting has been adjourned to enable the committee and the Board to confer upon this important matter, and to report to a meeting to be held a short time hence the conclusion to which they will have arrived. We cannot see that the shareholders could have adopted a wiser course. It seems to be not the best but practically the only solution of the difficulty. Respecting the tenour of the meeting itself, we, as well as the shareholders themselves, were startled at the accusations which Mr. SOUTHCOTT levelled against the directors, or, rather, against Mr. PIGOU. It all resolved itself into the complaint that the Palmarejo Company held quite a back place in comparison with the Mexican Minerals Railway, in spite of the Chairman's frequent protestation that the contrary was the fact. Mr. PIGOU, of course, could not let such an accusation pass without a strong denial, but even in spite of it we are afraid there is too much foundation for the complaint. The wisest course to take will be to amalgamate the two concerns. All admit this. It should have been done long ago. It is strange it has never before been acted upon. But the strangest of all is the opinion expressed by Mr. J. H. COLLINS—the well-known mining engineer and vice-President of the Institution of Mining and Metallurgy—that a railway is not needed. It has been nothing but extravagant and unnecessary outlay, and quite consistent with the past management. Such an opinion, coming at such a time, is startling. Mr. COLLINS knows the country, and the Palmarejo property intimately. He assures us—as other experts do—that the latter is extensive and valuable, but not so rich to enable it to support the extravagant expenditure the directors yearly incur. In the railway the shareholders have been saddled with a burden which should never even have been thought of. A mule tramway is not only far cheaper, but Mr. COLLINS assures us it is actually suitable to the nature of the country, far more so than a railway. How such a fact can hitherto have been overlooked is a mystery. We can place the greatest confidence in Mr. COLLINS's knowledge. To make such an assertion heedlessly and thoughtlessly would impair a reputation which every mining engineer profoundly respects. It is such a director the shareholders of the Palmarejo Company are in need of. We echo Sir EDWIN GALSWORTHY'S suggestion that they should keep their eyes on him in the reconstruction of the board. We are afraid, however, they will little heed the advice. They are ever clamouring for such men on their boards of management, but when the opportunity is offered them for fulfilliing their desires hey invariably reject it. In many curious and interesting ways they are a strange—we were about to say eccentric—section of the community. In the case of the Palmarejo Company, they have now found wise counsellors, and, no doubt, they will see it is to their interest to dutifully obey them.

A HINT TO THE SILVERSMITHS.

WHILE waiting for the restoration of silver to its normal position in relation to gold by some form of legislative bi-metallism, it may be worth while to consider some other methods by which relief may be given to the suffering producers of silver. The most obvious of these is the re-production and extension of a taste for silver plate. For domestic use, silver is far more beautiful than any other white metal, and it has many obvious advantages over even the best kinds of electro-plate. At the present price of bar silver—say 2s. 4d. per ounce—we ought to be able to obtain articles of tasteful design and good workmanship for 3s. per ounce, which would allow 4d. per ounce for workmanship, and as much for profit. At such a price it would soon drive electro-plate out of the market, to the great advantage of all concerned, except the electro-platers—a small class who could be readily employed elsewhere. It may be said that 4d. per ounce is not enough for the workmanship, but it is obvious that no other ordinary worker in ordinary metals gets nearly as much. Silver is more easily wrought than most other metals, and if we can get the advantages of machine work in brass, nickel, and other metals, why should we continue to pay artists' prices, and corresponding dealers' profits on articles which in no sense are other than ordinary manufactures? Let the silversmiths seize the opportunity; let them fill their windows with guaranteed standard silver spoons, forks, cream jugs, teapots, and similar articles of good design and execution, not only in the metropolis but in every market town in the country; let them arrange with engravers who will at the time of purchase engrave initials and dates at one penny per letter or figure, and it will not be long before every middle-class family will double or treble its stock of silver plate; every small shopkeeper and farmer, every artisan and clerk will have his two or three articles marked with the family name; every young woman of the lower class, who is to be married, will receive her wedding presents in "real silver," instead of in showy plated abominations, which look disgusting as soon as they have been cleaned two or three times. In Norway and Sweden there is hardly a peasant house-mother who has not her silver cream jug and spoons, at least, often a hundred years old or more, and there is no reason why the same should not be the case with us, if proper steps are taken to produce the taste and to facilitate such purchases. Consider what would be the result if in England and its colonies, and in the United States, the 20 millions of families averaged, as would very soon be the case, only 5 ounces of silver, not to speak of the similar accumulations in other countries, the world's idle stock of silver would be at once absorbed, the price of silver would at once go up, and the important silver mining industry would receive a new lease of life. Meantime, the initial led and dated articles would acquire increased value, both sentimental and actual, year by year, so keeping pace, at least, with the predicted advance of price of bar silver. And with the price of silver, that of all the commoner metals—as tin, copper, lead, and quicksilver—would almost certainly advance, to the great advantage of the miner and of the world's trade, and to the disadvantage of nobody in any perceptible degree.

It may be said that the silversmiths have already tried this plan, and with very little success. There are, indeed, one or two places in London where ugly and worn out spoons and forks, fit only for the melting-pot, can be bought for 2s. 9d. per ounce. But this is not what is required, nor what we have above suggested. If a new and permanent fashion is to be set, the things supplied must not only be purchaseable in all places, but they must possess something of beauty, or, at least, of quaintness and originality; and this at present is not to be got in silver articles for domestic use at anything like a reasonable cost.

NOTES AND COMMENTS.

THE long-suffering shareholders in the Mysore-Wynaad Consolidated Gold Mining Company and the Mysore West Gold Company, are to be asked next Monday to consent to a reconstruction, whereby to furnish sufficient money to open, raise, and crush "valuable gold quartz met with in the development of the 'Tank Block' mine." We greatly sympathise with them, for they have been led on from time to time with hopes which, so far, have not been realised. Operations have been confined for a considerable time, now, to the Tank Block portion of the property, and, therefore, it is to this place that attention is almost exclusively directed. From all accounts, it would appear that this portion is very promising, and quite justifies the expenditure proposed. Shareholders may, of course, hold a different opinion. They may think that sufficient money has already been spent upon it; that it has been developed to the extent necessary to test its value; and that, therefore, rather than raise this additional money, it would be better to finally wipe the companies out of existence. Whatever their judgment might be, we do not wish to interfere with it, or to offer guidance in the matter. They have a rather delicate case to consider, and were it not the fact that we believe the directors are acting in the best interests of the shareholders, and really striving to recoup them—though, unfortunately, they have not been very successful up to the present—we might be disposed to counsel an abandonment of the property. Reconstruction is never regarded with favour, and to make it palatable the directors will have a difficult task.

TAKEN as a scheme the one the directors propose can scarcely be improved upon. Briefly, it is as follows:—A new company is in each case to be registered with a share capital of £150,000 in as many shares of £1 each. The property of the Mysore West will be transferred to the new company for 127,408 shares, credited with 17s. 6d. paid up, and the shareholders will receive share for share. Mysore-Wynaad shareholders in their company will receive 125,000 shares with 17s. 6d. per share credited as paid up, and one share in the new company for every two shares held in the old. Each new company will create a 10 per cent. debenture debt of £10,000, and the debenture-holders in the new company will be in precisely the same position as they were in the old. The calls will be payable—6d. on application, and the balance as required, not exceeding 6d. per share, and at intervals of not less than three months. By this means the capital of the two companies will be reduced to £150,000 each, but the liability of 2s. 6d. in the case of Mysore-Wynaad will produce £15,625, and in that of Mysore West £15,926.

WE do not suppose for a moment that the scheme will pass muster with the majority of the shareholders on Monday. We have no doubt they will find many defects in it, and will offer what they consider to be many improvements. This is the common fate of all reconstruction schemes. They have, of course, to please so many individual tastes and interests. What the directors mainly desire, however, is that the capital necessary be forthcoming. Any scheme of reconstruction will provide such funds, and that the shareholders will ultimately agree to such a method of raising money we have little doubt.

LAST week evidence was furnished us of the depressing effect the low price of lead had upon home lead mining companies, and now we listen to a further tale of distress from Spanish mines—the Linares, Alamillos, and Fortuna companies—but a short time ago so wealthy and flourishing. In he case of the former company, however, there is not so much occasion for despondency. A fairly good profit has been made of £3595 16s. 7d. a decrease of £607 7s. 1d. upon that for the previous six months, which, considering the powerful circumstances that have combined to effect this, the directors rightly consider satisfactory. In consequence of the severe depression in the lead market, and the necessity for husbanding the resources of the company as much as possible, the directors were doubtful whether to declare a dividend or not, or to leave it in the hands of the shareholders to determine. However, a resolution has been passed for the payment of it, as was to be anticipated.

As far as the state of the mine goes, it could scarcely be better. To minimise the effect of the depression in the lead market the directors have continued, so they tell us, to keep down the expenditure in all departments, and it is due to this and to the rapid manner in which the mines are opened out that some profit continues to be made. Should the market improve, they rightly point out, the company will be in an admirable position to take advantage of it.

As for the Alamillos Company, the operations during the past half-year have also resulted in a profit, although not, of course, comparable to that of the Linares Company. The sum is £572 14s. 7d., which would have been larger, the directors inform us, but for the fact that the company had some considerable stocks of lead on hand at the date to which the accounts are made up, which stocks, in consequence of the fall in the price of lead, had to be valued at a much lower sum than that which ruled six months previously. During the past six months there has been no improvement of importance, nevertheless, a good rate of extraction has been obtained, and the reserves of discovered ore are again estimated at their previous total of 3200 tons. The mines are in an efficient state and in a position to take advantage of a rise in price of lead. The directors of the Fortuna Company have a much sadder tale to tell. Only a nominal profit has been earned, not due alone to the condition of the lead market. The poverty of some of the principal levels in the mines has also militated against the profits, and, in addition, has brought about a diminution in the reserves. We are hopefully told, however, that should the price of lead improve, there are many parts of the mines that could be advantageously worked, but which, at the present time, have to be treated as of no value. Then, again, compared with the corresponding period of 1892, present accounts are favourable.

THE candour and openness which characterised the speech of Mr. Trench at the meeting of the South African Trust and Finance Company will increase the confidence which the shareholders already place in his judgment and ability. His speech was thoroughly business-like and hit the precise pitch between optimism and pessimism, which was justified by the present condition of the company's affairs. The past year's results have been to some extent unfortunate, and the fact was not denied by Mr. Trench. But there was absolutely no occasion for anything like despondency, and that the Chairman took care to point out. The undertakings in which the company have been associated are such as to necessitate a serious risk, and this risk has in some unfortunate instances terminated against them. Here is matter for regret, but there is no reason to suppose that the future will be equally unsatisfactory. To begin with the experience which the directors are now able to bring to bear on their transactions must be of an increased value since the past is one from which, at least, they may gather lessons. But the most satisfactory augury for the future lies in the success which, beyond a doubt, has been attained in the past. At the end of the last year's working there was a substantial balance to the good, and if the outcome of what has been done during the past 12 months is less than what could have been hoped, it must not be forgotten that unsatisfactory years come in the history of every concern, and are not a fair criterion by which the soundness or otherwise of a company can be gauged. The outlook for the future is distinctly a promising one.

ACCORDING to Mr. Edward Pope's monthly circular, the share market at Gympie was comparatively quiet throughout February, but the month afforded a great contrast to the same period last year, when nearly all the mines were flooded, the crushing mills idle, and no ore was raised. He likewise informs us that some very important developments were made during this month, important not only because of their immediate effect upon the gold yield, but more particularly because they affect the permanence of the gold mining industry at Gympie, and point to its successful continuance for many years. These are hopeful statements, which we hope are not over-sanguine, nor imbued with the exaggeration generated by patriotism and self-interest. The quantity of ore crushed during the month was 6932 tons 6 cwt., which yielded 7448 ounces 11 dwts. The dividends paid amounted to £14,000 making the total to date £18,333 6s. 8d. Forty companies made calls amounting to £7518 6s. 8d. By a calculation made on the 1st of March, based on local market prices, he estimated the value of the mines to be £384,447, which was an increase of £66,202 for the month. The value on the same date last year was £242,635, showing an increase during the year of £141,812. Then, indulging in prophecy, he foresees large returns for March, barring a flood. He anticipates the output to be 10,000 ounces of gold for the month.

THERE are many promising districts in the world which could be made highly productive if capital were forthcoming to exploit

and develop them. It is almost too much to hope at the present moment, amidst the depression that has reigned for so long a time, that this abundance of money will be forthcoming; nevertheless, imagination can picture the time when this need will not be so great; when capital will be as abundant as it is now scarce; and when, in contrast to the present excess of cautiousness and saving, great desire will be shown to open up as many gold fields as offer evidence of promise. Considering the many complaints and lamentations on this head that reach us from numerous distant regions, we cannot pay much serious attention at present to an appeal from Mashonaland. It is well known that the genuineness of the gold fields of this country has been proved, and, therefore, that we cannot afford to despise it as a land of promise. An obstacle which greatly militates against the opening up of this region, and which is little likely to encourage the inflow of the capital at such a time as the present, is the slow and primitive method of transport. However, means are being taken to introduce improvements, and when in these greater progress has been made, appeal may more confidently be made for the much-needed capital to develop the country.

Asbestos has hitherto been a mineral which has enjoyed the happy, if obscure, fate of prosperity. The fluctuations have not disturbed the market, nor the inrush of huge "parcels" excited speculators. The mineowners have found no difficulty in disposing of their output at a satisfactory return upon capital. Now, however, the position seems likely to be altered, and shareholders in asbestos companies may share the lot of the ordinary mining adventurer in palpitating over the relationship of supply to demand, and both to dividends. A good deal of interest—not to say jealousy—has been awakened amongst the existing companies by the formation of a private company to work newly discovered deposits of asbestos in Griqualand, Cape Colony. The leading men in this concern are connecced with the De Beers DiamondMines, and the competition of South African asbestos with the Italian and Canadian is not, therefore, likely to weaken through want of sufficient capital. Moreover, it is claimed for this new fibre that its specific gravity is quite 25 per cent. less than the other varieties. Thus, at the same figures, Cape asbestos would be a great deal cheaper than its competitors. Moreover, it does not require any heavy expenditure to mine, as the deposits are nearly denuded, and all that is required is to blast it out of the ground with dynamite and load it into trucks.

The Italian and Canadian asbestos mine owners may, however, find several crumbs of comfort against this threatening competitor. In the first place, the cost of transport in South Africa is a heavy item, and then, again, the shipping charges to Europe will fall heavily upon the raw material. On the other hand, the consumption of the mineral is extending in all directions. It is used nowadays, we believe, for the filaments in incandescent electric lights, and threatens almost entirely to supersede cement as a material for coating steam boilers. Asbestos mill-board, cloth, &c., also may very likely come into enormous vogue for general packing and other purposes. There ought, therefore, to be plenty of room for the addition of South Africa's production to the existing supply. The position may be changed if it is true, as we hear, that extensive and very valuable deposits have lately been discovered in Italy by persons quite independent of the large capitalists, who have hitherto practically controlled the supply of the mineral. If Italy really possesses mines equal to those of Canada for the workable qualities of the fibre, a revolution may quite possibly be impending in the position of asbestos.

OUR CITY ARTICLE.

Friday Evening.

THE MINING MARKET.

A week for sellers—A relapse all round.

The past week has been one of profit-taking; of far greater selling than buying. The consequent result has been a general relapse, which has affected nearly every class of shares. At the very commencement of the week this tone set in, and business was then not quite on that extensive scale to which brokers have lately been accustomed. No doubt the market has taken a rest. No complaints, however, are made, for the general opinion is that it is but temporary, and that very early we shall again see a resumption of active dealing. Chartered have once more attracted attention on the news of further alluvial discoveries, but gold shares, on the whole, are quoted lower. The same discription applies to the South African as to the Indian and Miscellaneous department. The most important meeting this week has been that of the Palmarejo Company. The shareholders generally concur in the advice of the advisory committee to reconstruct the board.

British Mines.

The Dolcoath, Carn Brea, and Tincroft meetings have been the main features of the past week, and were, on the whole, satisfactory. A splendid report was presented at Dolcoath, and it was stated that the output can be easily maintained, whilst every £1 rise in tin will make about 2s. 6d. per share difference in the next dividend. Carn Brea are quiet at £11. Killifreths have had a sharp fall, but close fairly steady at 3½. Polberro have been in request at 22s. 6d. South Crofty are better at £3. The mine is looking well. Business in other mines has been limited. At the Wheal Agar meeting yesterday a call of 7s. 6d. per share was made.—Risen: Cook's Kitchen, 2s. 6d.; Dolcoath, 2s. 6d. (allowing for dividend of 12s. 6d.); Polberro, 2s. 6d.; South Crofty, 5s.; South Frances, 5s.; and Wheal Grenville, 10s.—Fallen: Carn Brea, 5s.; Killifreth, 10s.; Tincroft (allowing for dividend of 2s.), 3s.; West Frances, 7s. 6d.; West Kitty, 7s. 6d.; Wheal Basset, 5s.; and Wheal Kitty, 2s. 6d.

South African Shares.

At the beginning of the week business, as was to be expected, was not on quite such an extensive scale as that to which brokers have lately been accustomed. Prices naturally gave way to some extent on the usual realisations following on a sustained advance. Nevertheless, there was in existence a strong undercurrent. On the receipt of the cable announcing that three men had claimed rewards for the discovery of alluvial gold in Matabeleland, Chartered exhibited renewed strength, the shares closing at 38s. Bechs. also participated in the upward movement. There was a slackening of orders for Rand Gold shares, and in many instances prices were quoted lower. Cities and Simmer and Jack improved 1/16, whilst a similar rise took took place in Meyer and Charlton. Kleinfontein, Metropolitan, and United Langlaagte also improved. Modderfontein, Geldenhuis, Main Reef, and Virginia Transvaal all closed higher. On the other hand, a relapse of 1/16 took place in Village Main Reef, whilst New Clewer Estate were down to 1/4. Durban-Roodepoort finished at 5 3/4, Geldenhuis Deep at 3 1-32, Jubilee at 5 3/8, and Randt Mines at 8 1/4, which was a drop of 1/4 in each case. Jumpers re-acted 3-32, whilst reductions of 1/16 took place in Heriot, New Riets, United Roodepoort, and Wemmer. Shrinkages of a more trifling nature took place in Henry Nourse, Nigel, Robinson, and Wolhuter. Diamond shares were neglected, De Beers and Jagers both being easier. Further realisations brought about a general falling off on Tuesday. In gold shares the declines amounted to about 1/16 or 1/8. Chartered, which opened at 37s. 9d., fell to 36s. 3d., but were finally dealt in in the street at 36s. 9d. Bechs. fell to 32s. 6d. Jagers sympathised with the rest, and fell 1/8, but De Beers closed firm at 1 1/16. On Wednesday the flat tone continued, and quotations suffered a further moderate reduction. But in the afternoon prices hardened, and several denominations closed but slightly below the previous day's quotations. There was a further relapse in this department on Thursday, sellers again making their appearance. Amongst gold shares the largest fall took place in Crown Reefs to the extent of 1/16. Cities, Ferriera, and Henry Nourse were 1/8 worse, while falls of 3-32 took place in Consolidated Deep Levels, New Primrose, and Nigel. Langlaagte, United Roodepoort, Village Main Reef, Wemmer, and Wolhuter declined 1/16, whilst small losses occurred in New Crœsus, and George and May. Randt Mines and Robinson, on the other hand, improved slightly. Chartered were at one time as low as 34s. 6d. sellers, but they closed 35s. 6d. Consolidated Gold Fields eased off, but Gold Fields Deep were firm. Bechs., Zambesias, Oceanas, and Explorings were flat. Diamond shares also exhibited a dull tone, De Beers and Jagers each falling 1/8. Throughout to-day—especially in the morning—this department of the market has been extremely flat, owing to a continued disposition to snatch profits. Most of the business was transacted in Chartered, Consolidated Gold Fields and Bechuanalands, which were somewhat less firm than yesterday. Risen; Afrikander, 1s. 3d.; African Gold Recovery, 2s. 6d.; Buffelsdoorn, 2s.; Bultfontein Consolidated, 6d.; Champ D'Or, 1s. 3d.; Exploration New, 1s. 3d.; Geldenhuis Main Reef, 6d.; Grahamstown. 6d.; Klienfontein, 2s. 6d.; Moodies, 6d.; New Clunes, 1s. 3d.; Ophir, 9d.; President Land, 6d.; Stanhope, 2s. 6d.; Transvaal Coal, 6d.—Fallen: Bantjes, 6d.; Bechuanaland, 2s. 6d., Block B, 1s.; Chartered, 3s.; Consolidated Gold Fields, 5s.; Crown Reef, 17s. 6d.; De Beers, 10s.; Durban, 7s. 6d.; East Rand, 2s.; Edwin Bray, 6d.; Exploring, 10s.; Ferreira, 10s.; Frank Johnson, 2s. 6d.; Geldenhuis Estate, 2s. 6d.; George and May, 5s.; Glencairn, 2s.; Gold Fields of Mashonaland, 3s. 9d.; Henry Nourse, 2s. 6d.; Heriot, 2s. 6d.; Johannesburg Water, 6d.; Jubilee, 2s. 6d.; Jumpers, 2s. 6d.; Langlaagte, 5s.; Langlaagte Royal, 2s. 6d.; Lisbon, 6d.; Luipaard's Vlei, 1s. 6d.; May Deep, 1s.; Modderfontein, 1s.; Nigel, 3s. 9d.; New Belgium, 6d.; New Crœsus, 2s. 6d.; New Jagers., 20s.; New Primrose, 2s. 6d.; Northern Transvaal Land, 6d.; Oceana Development, 1s. 3d.; Oceana, 2s. 6d.; Princess, 1s.; Randfontein, 6d.; Rand Mining, 10s.; Robinson, 2s. 6d.; Salisbury, 2s. 6d.; Sheba, 6d.; South African Gold Trust, 1s.; South African Trust and Finance, 6d.; South Simmer and Jack, 1s. 3d.; Spes Bona, 2s. 6d.; Sutherland Reef, 9d.; Transvaal Exploration, 4s.; Transvaal Exploration and Land (15s. paid), 6d.; Transvaal Exploration and Land (fully-paid), 6d.; United Roodepoort, 3s. 9d.; Village Main Reef, 10s.; Wemmer, 2s. 6d.; Witwatersrand (Knights), 1s.; Wolhuter, 2s. 6d.; Zambesia, 12s. 6d.

Indian and Miscellaneous.

This market on Monday displayed a quieter tone than during the closing days of last week. Nevertheless, the undercurrent was firm. Broken Hill Props, were firm, with an advance of 1/8; Aladdin were strong at £2, the fortnightly crushings showing a satisfactory return of 956 ounces for 215 tons. Amongst Indian shares, Champion Reef were enquired for. St. John Del Rey were easier. On Tuesday there was a great decline of activity in this department of the market, though quotations, on the whole, were firm. Indians were almost unchanged. An easier tone characterised Aladdin and Wentworth, whilst trifling losses took place in Glenrock and Idaho, Amongst copper shares, Rio Tinto fell 1/8, but Cape Copper rose to that extent. Business on Wednesday was still slack. Gold Fields of Mysore fell 1/8, Mysore Reefs 1s., and De Lamar, Don Pedro, Montana, and Del Rey about 6d. in each case. On Thursday a further reaction took place in the miscellaneous department, the changes, however, being of a trifling character and needing no particularisation. Very little business was transacted in Indian shares to-day, the market being extremely flat. The principal feature was the run upon Mysores. The market for Gold Fields of Mysore was made somewhat flatter by the report that the directors contemplated increasing the capital of the company.—Risen: Alaska, 5s.; Bayley's Reward, 1s. 3d.; Brilliant Block, 1s. 3d; Gravel, 1s.; Mysore, 1s. 3d.; ditto Reef, 1s. 6d.; New Guston, 1s.; Pahang Corporation, 2s.; Pinos Altos, 6d.; Ripanji, 1s.; West Australian, 1s. 3d.—Fallen: Achilles, 5s.; Bonnie Dundee, 9d.; British Broken Hill, 6d.; Burma Ruby, 6d.; Day Dawn P.C., 6d.; De Lama, 1s. 6d.; Elkhorn, 1s. 6d.; Frontino, 1s.; Glenrock, 6d.; Gold Fields of Mysore, 2s.; Linares, 2s. 6d.; Montana, 6d.; Mount Morgan, 1s. 3d.; Mount Rose, 2s. 6d.; Mysore West, 6d.; ditto Wynaad, 6d.; New Queen, 6d.; Ooregum, 1s. 3d.; ditto Pref., 1s. 3d.; Poorman, 6d.; True Blue, 6d.; Victory, 1s. 3d.; ditto Ordinary, 6d.

STOCK EXCHANGE SETTLING DAYS.

Settling Days on the Stock Exchange are as follows:—

Consols, Friday, May 4.

STOCKS AND SHARES.

Continuation Days.	Ticket Days.	Pay Days.
Tues., April 24.	Wed., April 25.	Thurs., April 26.
Wed., May 9.	Thurs., May 10.	Friday, May 11.
Mon., May 28.	Tues., May 29.	Wed., May 30.

Patent Office Library.—Open free from 10 a.m. to 10 p.m. every week day. Containing English, colonial, and foreign specifications and trade marks; text books, periodicals, &c., in all branches of science, English and foreign. Number of readers during the week ending April 14, 1894, 2330.

Robey and Co. (Limited).—We are informed that Mr. W. W. Richardson, of the firm of Messrs. Doughty, Son, and Richardson, Lincoln, has joined the board.

THE EDITOR'S LETTER BOX.

**** We wish it to be understood that we do not hold ourselves responsible for, and do not necessarily endorse, the opinions of correspondents. All communications must be accompanied by the names and addresses of the senders, though these need not necessarily be published.*

ST. AUGUSTINE MINE, LIMITED.

TO THE EDITOR OF "THE MINING JOURNAL."

Sir,—Being a shareholder in the above company, and therefore interested in its capabilities and prospects, I have lately visited its property here, and wish to express a few of my views thereon, if you will kindly grant me a little space in your valuable paper.

Mr. Wilson, the manager, received me very courteously, and gladly showed me over the property, explaining where my own information was at fault, and generally making me acquainted with the workings of the mine. He also showed me the extent of the area of ground leased by the company, at the smallness of which I was astonished; and went with me to the Government Inspector of Mines Office here, where I inspected a plan prepared by the Government Surveyor, Mr. McBean, of the underground workings made since the mine has been started. After having this attention shown me, and after carefully considering the facts as placed before me, my deliberate opinion is that the property is absolutely worthless, and that the shareholders are (as I was myself until lately) quite unacquainted with the true state of affairs. What will the shareholders think when I tell them their mine is only 400 × 200 feet in area? I find Mr. Wilson has resigned his appointment here, and on enquiring the cause he told me he did not wish any longer to represent a company in whose property he has absolutely no faith. He also tells me that Captain Gilbert was honest from beginning to end with his reports, and he acknowledged the part of the play he could not understand was—(1) Why Gilbert did not defend himself from the aspersions cast upon him, and (2) why the majority of the shareholders do not believe their property valueless when they are so informed by a capable and independent man. It appears to me that much has been done to misinform the shareholders upon both major and minor points. One of the most glaring of these inconsistencies was perpetrated by Mr. Garcia Wolf (a gentleman well known in Kimberley), when he said, "Your committee does not consider the amount of work done by Captain Gilbert at all adequate to the amount of money expended; if this be so, why was there no complaint made with the former manager, who used to sink the shaft 5 ft. per week at a cost of £38 per foot under the same conditions as Captain Gilbert, who, on an average, sunk about 15 feet per week at a cost of £14 per foot, including timbering same and putting a ladderway, whereas the former did not include timbering and putting ladderway. I believe the lease of the ground expires in July next, and that it is renewable every five years at a rental of £1000. It is all very well for the directors to keep this concern going as long as possible, as I believe it means a handsome salary for them but if everyone was to receive a notice of the meetings when these reconstructions take place ("this being the fourth"), I think they would get frustrated by a big majority.

I have made many private enquiries during my stay in Kimberley, and I find they are, one and all, condemnatory of the property. In fact, the case is easily summed up in a leader of the *Diamond Fields Advertiser*, of October 25, 1891, a few extracts of which I copy below. This leader was called forth by the reconstruction of the St. Augustine (Limited) into the St. Augustine Mine (Limited), the third of these companies.

Extracts.

The soothing monotony of the St. Augustine (Limited), unbroken as yet by any distracting diamondiferous discovery, has prevented the people of Griqualand West from having their minds disturbed by the unfolding of riches beyond the dreams, not of avarice, but of modest expectation. All the excitement has been monopolised by the "bulls" and the "bears" of the London market, and for those who take an interest in the bobbing up and down process. We do not know of a single shareholder in the concern who is a resident of Kimberley. If there happens to be such a *rara avis* amongst the "pigeons" of the diamond fields, then we shall be happy to publish his name, and give him credit for his stedfastness of faith quite heroic. We ascertain that a report was sent "home" not long ago by Mr. Charles Wilson, the then manager or engineer. Mr. Wilson is no longer in charge of St. Augustine; his reign was a brief one, he being one of those painfully conscientious and severely honest individuals who are an inconvenience to some boards of directors. Mr. Wilson went from the Belgravia Mine to St. Augustine, and he is now back to the former property fulfilling the duties which he so ably fulfilled before he took his flight to the West. Mr. Wilson is earning £5 a week at Belgravia, but he was being paid at the rate of £600 per annum by the devotees of St. Augustine; and yet he was not happy. The secret is that he has a reputation as a diamond miner to lose. He has been on the fields for more than 20 years. He has been manager of several companies, and always succeeded in gaining respect and keeping the confidence of his employers, not only on account of his experience and practical knowledge, but his uprightness of character. We know perfectly well that his communication to the Chairman of the company must have contained a frank and straightforward statement as to the condition and prospects of the property. We ask why this report was not submitted to the meeting of shareholders? In fact, the registered designation of the company is suggestive of two characteristics—"St. Augustine, Limited," with an extremely limited power of diamond production, and a seemingly unlimited power as regards increase of capital.—I am, Sir, yours, &c.

J. E. Counsell.

Kimberley, South Africa, March 26th, 1894.

FORTHCOMING MEETINGS.

**** We shall be obliged if Secretaries or other Officials of Mining, Railway and other Companies will be good enough to advise us as early as possible of the date, time and place of their forthcoming meetings—whether statutory, semi-annual, annual, general or extraordinary, confirmatory or adjourned—in order that particulars may be announced for the benefit of our subscribers and more particularly our country readers. Balance sheets, reports and other matter to be submitted at such meetings should, where possible, accompany the intimations of the meetings sent.*

Name of Company.	Date.	Nature of Meeting.	Place.	Time.
Mysore Wynaad Con.	April 23	General	Winchester Ho	1.30 p.m.
Mysore West Gold Co.	April 23	General	Winchester Ho	3.0 p.m.
Panuelillo Copper Co.	April 24	General	Winchester Ho	2.0 p.m.
Zambesia Exploring Co.	April 24	General	Winchester Ho	2.30 p.m.
Forbes Reef Gold Mg. Co.	April 24	General	Cannon-street	2.0 p.m.
Australian Mortgage Land	April 25	General	Cannon-street	12 noon
Rio Tinto	April 27	General	Cannon-street	1 p.m.

MINING IN CORNWALL AND DEVON:

NOTES ON WESTERN MINING, EDITORIAL AND OTHERWISE.

SHAREHOLDERS who have been connected with Killifreth the longest will regret the most the death of the late manager, Captain John Michell. He had been connected with the mine for the best part of 20 years, and during that time his energies have been devoted entirely to the development of the property. Captain Michell did not possess the oratorical abilities which are now so generally indulged in by mine managers, and his quaint sayings frequently created no little merriment at the meetings, particularly when they used to be held in the old ticketing room at Tabb's Hotel. There was one eccentricity which invariably came out. Captain Michell had been accustomed to the old Cornish mine meeting, where the manager always gave the shareholders some information respecting the mine after they had been regaled with a substantial dinner, followed by the inevitable bowl of punch, and the more modern custom of including that in the ordinary business of the meeting seemed to puzzle him, and without exception he would reply to the invitation to give the adventurers some idea of the prospects for the future with "Well, gentlemen, I thank you for having drunk my health, which at present, &c." Roars of laughter would greet this somewhat incongruous opening, but Captain Michell always took it in good part, and the information which he imparted was always reliable—which is a great deal more than can be said of all the utterances of the past, and even some of the present, Cornish mine agents. He was a good miner, had proved a capable manager, and it is largely to his foresight and able management that Killifreth adventurers find themselves in their present fortunate position. He was seventy years of age, and for the last year or two his health had failed greatly, so much so that a month or two ago he was compelled to tender his resignation to the committee of the mine. Formerly, Captain Michell was associated with the management of Grambler and St. Aubyn Mine and East Carn Brea, both in the Redruth district, and both of which were worked for copper.

THREE leading mines of the Camborne district held their meetings on Tuesday. In each case the result was much in accordance with the forecast which we published last week, and showed more convincingly than could have been the case with concerns returning smaller amounts of ore how disastrous have been the results of the ruinously low price of tin. The last quarter was considered very unsatisfactory in point of price, but had the mines received the same amount this quarter as then there would have been between £4000 and £5000 to be divided among the shareholders. Dolcoath still remains far and away the leading tin mine of the county, and, indeed, of the world. The adventurers have grown quite accustomed to hear Captain Josiah Thomas declare that the mine is looking better than ever, and scarcely seem to realise the immense importance of this to the neighbourhood, and especially to the town of Camborne. The position of the mine was never more thoroughly assured than at the present moment. The reserves appear to be inexhaustible, and although the enormous quantity of 617 tons of black tin has been returned in three months, this has been done without touching any of the very rich ground which was temporarily idle in the neighbourhood of the "run." The most extraordinary fact is that the new level underneath this is opening up even more productive, and Captain Thomas informed the shareholders that they had a lode there which, he believed, was unparalleled for size and richness in the history of Cornish mining. This lode has already been opened on to a width of 26 feet, and no wall has yet been found. For the whole of this width the stuff will average by actual sample 1½ cwt. of tin to the ton, and the north part of it is even richer. Dolcoath really seems to have more tin than the agents know what to do with. The dividend of 12s. 6d. was rather less than was generally expected, but the profit would have admitted of a little more had the executive considered it desirable.

THE dividend of 2s. at Tincroft was just what was anticipated and the report of Captain Teague indicated pretty clearly that the returns will be increased in the future. Tincroft is opening up remarkably well, and the new contract which they have taken for the sale of arsenic will prove a very valuable addition to the credits during the next 12 months.

AT Carn Brea £234 represented the very trifling loss, for which the drop in the price of mineral is entirely responsible. The great feature for the future here will probably prove to be the development of the Highburrow east part of the mine. The new pumping-engine is doing its work admirably, and this part of the mine is now completely unwatered, so that the exploratory work can be pushed on at a good rate. In this they will be greatly assisted by the increased power which the new air-compressor, now in course of erection by Messrs. Holman Brothers, will give them. This work will be completed within the next month or so, and a number of boring machines will be put to work in Highburrow East.

WHEAL BASSET meeting will be held on Tuesday, when a call of 3s. will be recommended by the committee to cover the loss of £847. An extra quantity of six tons of tin has been sold, and the amount realised for the increased quantity is £179 less. An economical policy has been necessary here, as in most other mines, with the result that a saving has been effected of £528 19s. 3d. in labour pay. It is to be hoped that this has not been at the expense of exploratory work.

IN addition to these other difficulties, the shareholders seem likely to have a lawsuit on their hands, the Illogan Vestry having decided to appeal against the decision of the assessment committee of the Redruth Union to practically omit Wheal Basset from the rate book. Under the Mines Rating Act of 1874, mines are assessed on the amount of dues paid, but the Wheal Basset committee maintain that as they pay no dues (under the terms of the lease) when certain conditions prevail, they are exempt. This position is contested on behalf of the overseers, and unless an arrangement can be come to, the matter will be fought out in a court of law.

AT the New Chimes, the north reef has recently been proved, and found of good value. The reef is from 3 ft. to 4 ft. wide.

NEWS IS FOOD FOR ACTIVE MINDS, especially in these days of quick communication, when we are enabled within a few hours to know what is taking place at the other end of the world. The merits of Holloway's Pills and Ointment, which have been familiar for over half a century amongst all civilised people have been still more widely spread owing to these facilities. To the natives in the uttermost parts of India, Africa, Australia, and, indeed, to the whole human family, those remedies have been amongst the most precious gifts of civilisation. They cure disease and relieve the most acute pain. In cases of fever, ague, and liver and stomach complaints they are unequalled, whilst for wounds, bruises, sores, &c., they are the best known remedies.

MINING NOTES.

HOME, COLONIAL, AND FOREIGN.

M. HENRI MOISSAN lately presented to the Paris Academy of Science a specimen, weighing 200 grammes (6⅞ ounces) of borate of carbon, which forms part of a series of new compounds, obtained by the electric furnace, possessing great hardness and stability. This substance is very hard and friable, resisting nearly all the most energetic re-agents of the laboratory, while it scratches the ruby, and its dust cuts the diamond.

ACCORDING to returns published April 14th regarding the gold output from the Bendigo and Ballarat Mines for the past fortnight, the production in the former district amounted to 6065 ounces, and the dividends declared to £5418, while the Ballarat Mines yielded 6499 ounces, and the dividends declared were £4175.

THE first week in March, 13 ounces were taken from the Sixth Creek in the neighbourhood of the old Adelaide Mine. The owner of the land in which the mine is situated is Mr. A. E. Tolley, wine merchant, of Currie Street, who has generously allowed his property to be prospected without royalty on the gold obtained. The locality is the same in which the first discovery of gold was made in Australia, and a brooch made therefrom was, it is asserted, sent for presentation to the Queen.

THE Australasian Mining Company, says the *North Queensland Register*, which made such a bad bargain in buying the Gympie Great Eastern, is looking out for a West Australian property, and propose to purchase Lord Percy Douglas's Premier Extended Mine at Coolgardie. The company is plucky if it is not lucky.

THE reef has been cut into in the deep ground at the Tasmanian Mine, at Beaconsfield, Tasmania. This mine has not paid a dividend for two years. It was offered in the early days to a Ballarat syndicate for £5000 and not accepted, and since then Mr. Hart, of Launceston, has got £250,000 in dividends from it. The Mount Bischoff Tin Mine was offered to a Melbourne syndicate by philosopher Smith for £10,000, but they did not fancy the bargain. Mr. Hunt and others in Launceston got into it, and it has given them £1,000,000 in dividends. Dr. Agnew has drawn £4000 a year for about 16 years from the Mount Bischoff Company for an original expenditure of a couple of hundred pounds.

THE shareholders of the Langlaagte Estate have, it is said, sanctioned the issue of shares to bearer, on the basis of one bearer share representing four ordinary £1 shares.

THE new mill at the New Primrose property, now in course of erection, will, when completed, consist of two rows of 80 stamps each. The new stamps will be 1050 lbs. weight, 50 of those at present in use being 950 lbs., and 50 750 lbs. The capacity of those at present in use is 5 tons per stamp per diem, so that the probable crushing capacity of the new mill can be to a certain extent gauged.

IN February the Glencairn Company made a profit of £3600, the Buffelsdoorn a profit of £2438, and the Wolhuter a profit of £2697.

THE new headgear at the Geldenhuis Estate is now complete. The mine will in future be worked solely from the east and west main incline shafts.

IT is stated (says the Johannesburg *Star*) on excellent authority that the Matabele are ready to work at the mines, and have learnt their business efficiently. It is, therefore, probable that a regular output will take place in Mashonaland from the current year.

OUR readers will be interested to know that Mr. E. Henry Davies, M.E., F.G.S., who has for some time been a frequent contributor to these columns, and who is also well-known to the mining public through his works on mining and "Machinery for Metalliferous Mines," is just about to start on an official visit to the mining districts of Colorado and California. Mr. Davies carries with him our best wishes for a successful visit and a safe return; and, while we feel sure that his clients will have every cause to be gratified with his services, we trust that he will not discontinue his connection with *The Mining Journal*.

NOTWITHSTANDING the official report recently submitted by Dr. King, of the Geological Survey of India, says *Indian Engineering*, as to the non-existence of gold reefs in the neighbourhood of Wuntho, a few wary adventurers, in order to create a boom, assert that the doctor did not go within five miles of the fields, in which it is said that very rich gold reefs exist, and further confirm their statements by the discovery of gold nuggets weighing 3½ ounces. We hardly think that with Dr. King's experience in these matters, supported by the fact that Dr. Fritz Noetling was also of the same opinion, there are any grounds for doubting the conclusions arrived at by him. Surface quartz exists in many localities in Burma, and traces of workings have also been discovered, but not to the extent that will bear any great expenditure and give remunerative returns.

[*Received too late for classification.*]

RIO TINTO COMPANY (LIMITED).

NOTICE IS HEREBY GIVEN, that the TWENTY-FIRST ORDINARY GENERAL MEETING of the shareholders will be held at the Cannon Street Hotel, London, E.C., on FRIDAY, the 27th April, 1894, at Two o'clock precisely, for the purpose of receiving the Directors' Report and Statement of Accounts, for the Declaration of a Dividend, and for other purposes.

Holders of Share Warrants to Bearer will receive a Ticket of Admission, on depositing their Warrants in accordance with the Articles of Association three days prior to the Meeting, either at the Company's Offices in London, or at the Société Générale, Rue de Provence, 56, Paris, or at the Deutsche National Bank in Bremen.

The Retiring Directors are Henry Doetsch, Esq., and J. M. Macdonald, Esq. Mr. Doetsch, being eligible for re-election, offers himself accordingly. Mr. Macdonald does not seek re-election. The Board proposes, for the approval of the Meeting, the Election of Robert William Buchanan Jardine, Esq., in his place.

The Retiring Auditors are Messrs. Turquand, Youngs, and Co., who, being eligible for re-election, offer themselves accordingly.

The Transfer Books will be closed from Saturday the 21st to Saturday the 28th, both days inclusive.

By order of the Board,
GEO. N. THOMPSON, Secretary.

Offices of the Company, 30, St. Swithin's Lane,
London, E.C., 20th April, 1894.

THE METAL MARKETS.

LONDON METAL MARKET.

THE METAL MARKET—LONDON, APRIL 20.

Copper.

THE market has developed no new feature of interest during the week under review. It opened dull with business at £40 16s. 3d. three months, *i.e.*, a decline of 1s. 3d., and later in the day down to £40 3s. 9d. s.c., was done. On Tuesday, after a further fall to £40 2s. 6d. s.c., the tone and values were improved by moderate purchases and bids, and £40 3s. 9d. and £40 7s. 6d. were successfully paid for cash. On Wednesday morning £40 17s. 6d. s.c. was paid for three months, but later in the day, one or two sellers coming out, the value gave way, £40 3s. 9d. three months and £40 2s. 6d. s.c. being recorded towards the close. The following day brought a continuance of the slackness, and spot touched £42 1s. 3d. To-day there was a small turnover at £40 2s. 6d. and £40 3s. 9d. s.c., and the market closed steady at £40 2s. 6d. to £40 5s. s.c., and £40 12s. 6d. to £40 15s. three months. Furnace material keeps very quiet, and transactions are few and far between. Consumptive enquiry is of a meagre description.

Tin

This article opened firm on the rise in silver to 29½d. and cash Straits was done at £70 10s. and three months £71 7s. 6d., but £70 5s. and £71 5s. were done later in the day, and on Tuesday there came a further relapse to £70 17s. 6d. three months and £70 s.c., silver having fallen ½d. Sellers were rather more active on Wednesday and spot declined to £69 10s. Thursday's market was rather firmer and business took place at £69 17s. 6d. s.c. and £70 15s. three months. To-day the position remains practically unaltered, and the close is steady at £69 12s. 6d. to £69 15s. s.c., and £70 10s. to £70 15s. three months. Biliton opened at 42¾ fl. s.c., touched 42½ fl., but closes at 43 fl. with three months at 43¼ fl.

Pig Iron.

The shipments from Scotland last week were 7239 tons, or 1304 tons less than in the parallel period of last year. In Glasgow, the value of cash Scotch declined from 42s. 11d. to 42s. 6½d., and closed at 42s. 8½d., after good business had been done.

Lead

has declined to £9 2s. 6d., at which price business has been done in soft foreign. The close is dull at £9 2s. 6d. sellers of soft foreign, and £9 3s. 9d. English.

Spelter

has declined in value, and closes steady at £15 12s. 6d. to £15 15s. for ordinaries, and £15 15s. to £15 17s. 6d. for specials.

Antimony

is dull at 34s. 10d. to 35s.

Quicksilver

remains steady at £5 12s. 6d. firsts and seconds.

The following are to-night's (April 20) prices of metals;—

	£ s. d.	£ s. d.
Copper.		
Tough cake and ingot	42 2 6	43 15 0
Best selected	43 1 6	43 15 0
Sheets and sheathing	50 10 0	51 10 0
Flat bottoms	53 10 0	54 10 0
Chili bars / Good merchantable, / Copper tubes, seamless — spot, & 3 months respectively	40 2 6	40 12 6
	—	0 0 7¾
Alloys.		
Brass: Wire	—	0 0 5¾
,, Tubes (solid drawn)	—	0 0 5¾
,, Sheets	—	0 0 5¾
Phosphor Bronze: Alloys II.	—	88 0 0
,, ,, III. or V. } Cog Wheel Brand	—	93 0 0
,, ,, VII. }	—	95 0 0
,, ,, XI. }	—	90 0 0
,, ,, Vulcan brand A1 B.C.	80 0 0	85 0 0
Duro Metal	89 0 0	85 0 0
Bull's Metal	—	70 0 0
Ferrobronze (Vivian's).		
Ingots ...per lb.	0 0 5¾	—
Ordinary sheets, plates, bolts and bars	0 0 6¾	—
Screw bolts and nuts	0 0 8¾	—
Pump rods, plain	0 0 7¾	—
,, finished	0 0 10¾	—
Delta Metal: No. 4 (per ton)	—	73 10 0
,, Sheets and plates (perlb.)	0 0 10½	—
,, Bars, round, square, flat (per lb.)	0 0 9¾	—
,, ,, hexagon (per lb.)	0 0 9	—
Tin.		
English, ingots, f.o.b.	74 10 0	75 0 0
,, bars	75 10 0	76 0 0
,, refined	76 10 0	77 0 0
Straits, spot and 3 months respectively	69 15 0	70 15 0
Australian spot, and three months respectively	70 0 0	71 5 0
Banca ,, (in Holland)	73 5 0	74 2 6
Tin Plates: Charcoal, best quality per box	0 16 0	0 18 6
,, ,, ordinary	0 14 6	0 15 6
,, Coke, best quality	0 11 3	0 11 9
,, ,, ordinary	0 10 3	—

These prices of tinplates are f.o.b. at Swansea: at Liverpool 6d. per box more.

Iron.		
Pig, G.M.B., f.o.b., Clyde, spot	—	2 2 8½
,, Scotch pig, No. 1 Gartsherrie	—	2 11 0
,, ,, Coltness	—	2 16 0
,, ,, Clyde	—	2 9 6
,, ,, Govan	—	2 4 3
Bars, Welsh, f.o.b. Wales	—	5 5 0
Plates ,, ,,	—	6 2 6
Bars, Staffordshire, at works	—	5 10 0
Sheets ,, ,,	—	6 10 0
Plates ,, ,,	—	6 7 6
Hoops ,, ,,	—	5 15 0
Ship plates, Middlesborough	—	4 18 9
Steel: English spring nominal / cast } according to quality	11 0 0 / 38 0 0	20 0 0 / 42 0 0
,, Rails at works, according to section	8 13 9	4 17 6
Lead.		
Spanish or soft foreign	—	9 2 6
English pig, common	—	9 3 9
,, L.B.	—	9 15 0
,, sheet and bar	—	10 2 6
,, pipe	—	10 12 6
,, red	—	12 0 0
,, white	—	16 10 0
,, patent shot	—	13 10 0
Spelter.		
Silesian ordinary brands	15 12 6	15 15 0
,, special brands	15 15 0	15 17 6
English Swansea	16 5 0	16 7 6
Sheet Zinc	18 10 0	18 15 0
Antimony.		
Antimony	34 10 0	35 0 0
Quicksilver.		
Flasks, 75 lbs. warrants	—	5 12 6
Manganese.	per unit.	
Ore, c.i.f., U.K. ports		
1st quality, 50 per cent. and upwards	0 0 11	0 1 0
2nd ,, 47 per cent. to 50 per cent.	0 0 10	0 0 11
3rd ,, 40 ,, 47 per cent.	0 0 9	0 0 10
Aluminium.		Per lb.
98-99½ per cent. (guaranteed 98 per cent. min.)	in ingots (1 cwt. lots)	0 2 9
do do	(5 cwts. and up)	0 11
Nickel.		
98-99 per cent. guaranteed	0 1 7½	0 1 8½

N.B.—In our price lists of 31st March and 7th April the price of best selected copper appeared; owing to a misprint; as £44 to £45 15s. It should have read £44 to £44 15s. in each case.

The offices of the *West Australian Review*, which is edited by Albert F. Calvert, M.E., F.R.G.S., is at 47, Old Broad-street, E.C.

"THE MINING JOURNAL" SHARE LIST.

ABBREVIATIONS AND REFERENCES.—The following are the significations of the abbreviations and references which occur in the Share List:—*Ay*, Antimony; *A*, Arsenic; *Bl*, Blende; *Bx*, Borax; *C*, Copper; *D*, Diamond; *G*, Gold; *I*, Iron; *L*, Lead; *M*, Mundic; *N*, Nitrates; *P*, Phosphates; *Q*, Quicksilver *R*, Ruby; *S*, Silver; *S-l*, Silver-lead; *Sul*, Sulphur; *T*, Tin; and *Z*, Zinc. * in the "called up" column of British Mines, signifies that the mine is conducted on "Cost Book" principles: ‡ in the "Head Office" column of African Mines, signifies that the address given is not that of the head office, but of a sub- or transfer office and †, following the names of African mines, signifies that they are subject to the Limited Liability Law of the South African Republic.

The following is by far the most complete and comprehensive list of mines, in whose shares business is being currently transacted, published. Additions will be made from time to time as occasion requires. Every effort is made to ensure accuracy, and Secretaries of Companies, Share dealers, and our readers generally, are cordially invited to co-operate with us to this end, by notifying us of any errors that may at any time occur. We desire it to be understood that, while our Share List will almost invariably be found correct; we do not hold ourselves responsible for any loss or inconvenience that may arise from possible inaccuracies.

BRITISH MINES.

Name.	Closing Price, Apr. 20, 1894	Closing Price, Apr. 13, 1894.	Par. £ s.	Latest Dividend	Called up Per Share. £ s. d.	Shares Issued.	Situation of Mine.	Head Office.
Atlas ... T	—	—	1 0	—	0 12 6	12,000	Devon	Camborne.
Blue Hills ... CT	1/- 3/-	3/-	*	2/- May '81	6 16 6	6,000	Cornwall	Camborne.
Botallack ... T	½ ¾	—	*	—	51 4 6	2,220	Cornwall	St. Just.
Carn Brea ... T	10¾ 11	11⅛	*	2/6 Dec.,'93	21 5 0	6,000	Cornwall	Carn Brea.
Cook's Kitchen ... T	⅞ 1	30/-	*	—	29 5 4	4,900	Cornwall	Camborne.
Cumberland ... L	—	—	1 0	5% May, '88	1 0 0	55,000	Cumberland	7, Angel-court E.C.
Cwmystwyth ...	—	—	1 0	—	1 0 0	5,000	Cardigan	
Derwentwatr. CLZ	—	—	1 0	—	1 0 0	1?,?50	Cumberland	Manchester.
Devon Gt Cons. CA	15/- 20/-	20/-	5 0	3/- Nov. '93	2 0 0	19,24?	Devon	8, Finsbury-circus.
Dolcoath ... T	78 79	79½	*	5/- Jan. '94	9 12 6	4,790	Cornwall	Camborne
Drakewalls CTM	-/6 -/9	—	1 0	12/6 Apr. '94	1 0 0	100,000	Cornwall	Dashwood House.
East Blue Hills T	—	—	*	—	1 18 3	4,283	Cornwall	79¼, Gracechurch-st.
EastGrassington L	—	—	1 0	—	1 0 0	20,000	Yorkshire	Palmerston-building
East Pool ... AT	10¾ 11¼	11¼	*	2/- April '94	0 9 9	6,40?	Cornwall	Illogan.
Gawton ... CA	—	—	50/-	—	2 7 0	12,0??	Devon	20, Great St. Helens.
Great Laxey ... L	2 3	3	4 0	5/- Apr.,'92	4 0 0	15,000	Isle of Man	Douglas, Isle of Man.
Green Hurth ... L	—	—	1 0	-/6 June '89	0 19 0	32,000	Cumberland	Newcastle.
Halkyn ... L	—	—	1 0	2/- Sep. '93	1 0 0	10,000	Flintshire	Chester.
Hexworthy ... T	—	—	1 0	—	1 0 0	18,335	Devon	6, Queen-street-place
Isle of Man ... L	—	—	5 0	5/6 Sep. 93	5 0 0	14,000	Isle of Man	Chester.
Killifreth ... T	3⅛ 3⅜	3⅞	*	3/6 Dec. '93	5 6 3	6,000	Cornwall	Truro.
Kingside ... LB	—	—	1 0	3/- May, 1892	1 0 0	15,919	Cardiganshire	6, Queen-street-place
Lead Hills ... L	17/6 22/6	22/6	6 0	3/- Sep. '92	6 0 0	20,000	Lanarkshire	30, Finsbury-circus.
Levant ... CT	—	—	*	10/- Aug.,'93	11 9 6	2,500	Cornwall	Penzance.
Lovell ... T	—	—	*	1/3 Nov.,'91	1 16 7	7,165	Wendron	3, Gt. Queen-st., S.W.
Minera (New) ... L	—	—	5 0	3/- Mar. '90	5 0 0	9,000	Denbighshire.	Minera, N. Wales.
Nenthd&Tudle. LZ	—	—	1 0	6% Feb., '91	0 18 6	48,8?5	Northumberld	Newcastle-on-Tyne
New Balleswidd'n T	—	—	1 0	—	1 0 0	50,000	Cornwall	St. Clement's Ho., E.C
NewCooksKitn. TC	—	—	*	—	10 18 3	4,900	Cornwall	Camborne.
Pedn-an-drea ... T	—	—	*	—	4 3 6	7,000	Cornwall	Redruth.
Phoenix United TC	6/- 7/-	7/-	*	1/- Mar. '90	6 9 9	17,000	Cornwall	Liskeard.
Polberro ... T	20/- 25/-	22/6	*	—	1 11 6	18,000	Cornwall	37, Walbrook.
Prince of Wales TC	2/- 3/-	3/-	10/-	—	—	—	Cornwall	6, Draper's-gardens.
Roman Gravels L	—	—	10/-	—	—	—	Salop	11, Queen Vic-st., EC
Rushen ... L	—	—	1 0	5% Sept. '91	1 0 0	26,131	Isle of Man	Douglas.
So. Condurrow TC	7/6 12/6	12/6	*	3/6 Apr. '93	7 12 1	6,123	Cornwall	20, Great St Helens
South Crofty TA	2¾ 3¼	3	*	—	17 2 6	6,120	Cornwall	Pool, Cornwall.
South Darren ... L	—	—	—	—	—	—	Cardiganshire	6A, Austin Friars.
South Frances ... T	1½ 1¾	2⅞	*	—	18 1 0	4,500	Cornwall	Redruth.
Tincroft ... T	12¾ 12½	13	*	2/- Apr. '94	15 7 6	6,000	Cornwall	Carn Brea.
Weardale ... L	—	—	4 0	1/3 Oct. '90	1 5 0	60,000	Durham	3, Lombard-court.
West Frances ... T	2¼ 2½	2⅞	—	2/6 May,'89	16 0 1	6,144	Cornwall	Camborne.
West Kitty ... T	6⅞ 7⅛	7⅛	*	4/- Jan. '94	6 12 0	6,000	Cornwall	37, Walbrook.
Wheal Agar ... TA	2 2¼	2⅛	*	2/6 Aug. '88	22 8 2	6,000	Cornwall	Redruth.
Wheal Basset ... TC	2¾ 3¼	3⅛	*	10/- Apr.'88	12 3 0	6,144	Cornwall	Redruth.
Wheal Friendly ... T	2/- 4/-	4/-	*	—	0 11 3	10,000	Cornwall	37, Walbrook, E.C.
Wheal Grenville T	15 16	15¼	*	3/- Feb. '94	18 2 0	6,000	Cornwall	7, Union-court, E.C.
Wheal Kitty ... T	2/6 3/6	12/6	*	3/- Mar. '88	7 9 6	4,295	Cornwall	Truro.
Wheal Metal &F. T	⅛ ¼	—	*	—	0 13 9	10,784	Cornwall	79¼, Gracechurch-st

AUSTRALIAN AND NEW ZEALAND MINES.

Name.	Closing Price, Apr. 20, 1894	Closing Price, Apr. 13, 1894.	Par.	Latest Dividend	Called up Per Share.	Shares Issued.	Situation of Mine.	Head Office.
Achilles Gld Fld.	1¼ 1⅜	1⅛	1 0	—	1 0 0	80,307	New Zealand	3, Church Pas., E.C.
Aladdins Lamp G	2 2⅛	2 1/16	1 0	1/- Apr. '94	1 0 0	100,000	N S Wales	4-6, Throg. Avenue.
Anglo-Saxon ... G	—	—	1 0	2/- July, '89	1 0 0	51,000	Queensland	4, Lombard-court.
Australasian ... G	2/- 2/6	2/6	1 0	-/6 Mar., '92	1 0 0	210,000	Queensland	6, Queen-st. place
Australian ... C	—	—	20 0	1/6 Aug. '93	7 10 0	18,315	So. Australia	15, Old Jewry Chbrs.
Aus. Bro. Hill Con.	1/6 2/-	1/9	1 0	1/- June, '91	1 0 0	540,000	N. S. Wales	Winchester House.
Blue Spur & G. G.	-/6 1/-	1/-	1 0	—	1 0 0	75,926	New Zealand	6, Gt. St. Helens'
Bonnie Dundee G	3/6 4/-	4/9	1 0	—	0 18 0	120,000	Queensland	3-5 Gracechurch-st
Brilliant Block ... G	1⅛ 1¼	1 3/16	2 0	-/6 April '94	2 0 0	250,000	Queensland	3, Gracechurch-st.
Brit. Brok. Hill S	2/6 3/6	3/6	5 0	—	5 0 0	240,000	N. S. Wales	Abchurch Chambers.
Broken Hill Prop.	2 11/16 2 9/16 xd	2 9/16	8 0	1/- Apr. '94	0 8 0	960,000	N. S. Wales	Abchurch Chambers.
Carrington ... G	2/6 3/-	3/-	12/6	—	0 12 6	100,000	Queensland	9, Tokenhouse Yard.
Craven's Cal.	3/- 4/-	4/- xd	6 0	-/3 Apr., '94	0 4 8	100,000	Queensland	30-1, S. Swithin's-le.
Croydon King Blk	—	—	5/-	—	0 5 0	60,000	N. Queensland	Leadenhall Blg, E.C.
Cumbrind (New) G	-/9 1/3	1/3	1 0	2/6 Dec. '87	1 0 0	200,000	Queensland	Blomfield House E.C.
DayDawn B.&W. G	4/6	4/6	1 0	-/6 Mar. 93	1 0 0	498,400	Queensland	3-5, Gracechurch-st.
Day Dawn P. C. G	4/6 5/-	5/3	1 0	-/6 Apr. '92	1 0 0	490,000	Queensland	Winchester Ho., E.C
Eaglehawk ... G	1/3 1/9	1/9	1 0	—	0 18 6	120,000	Victoria	31, Lombard-street.
Etheridge ... G	—	—	5 0	—	0 5 0	324,290	Queensland	6-7, Queen-street-pl.
Golden Gate ... G	1/- 1/6	1/3	10/-	—	0 10 0	150,000	Queensland	9, Tokenhouse Yard.
Glenrock	2/- 2/6	3/-	1 0	—	0 19 6	225,000	N. Zealand	3-5, Queen-st. E.C.
Harriesville ... G	—	—	1 0	-/6 July, '90	1 0 0	146,330	Victoria	6-7, Queen-street-pl.
Kaboonga ... G	1/4½ 1/7½	1/10½	10/-	—	0 10 0	500,000	Queensland	30, St. Swithin's-lane
Kangarilla ... S	-/9 1/3	1/3	1 0	—	1 0 0	88,275	So. Australia	68, Coleman-street.
Kapanga ... G	-/9 1/-	1/3	1 0	-/6 Jan. '91	0 18 9	250,000	N Zealand	9, New Broad-street.
Klikivan	—	—	1 0	—	1 0 0	120,000	Queensland	4, Coleman-street.
Midas G. F. ... G	—	—	1 0	—	1 0 0	180,000	Victoria	32, Poultry, E.C.
Mills' Day Dawn G	1⅛ 1¼ xd	1¾	1 0	-/6 Apr. '94	0 15 9	300,000	Queensland	3, Gracechurch-st.
Moruya ... GS	—	—	1 0	—	1 0 0	59,235	N. S. Wales	16, St. Helen's-place.
Mosman ... G	4/3 4/6	5/3	1 0	-/3 Jan. '94	1 0 0	185,000	Queensland	3-5, Gracechurch-st.
Mt. Leyshon ... G	-/9 1/-	1/6	1 0	-/6 Dec. '90	1 0 0	157,989	Queensland	7, Draper's-gardens.
Mountain Maid G	1/6 2/6	2/6	10/-	—	0 6 3	56,000	Queensland	Leadenhall Bldgs.
Mt. Morgan Ex. G	2 2⅛	2 3/16	5/-	-/6 Mar., '94	0 2 0	180,000	Queensland	4, Tokenhouse Bldgs
Mt. Shamrock GB	—	—	1 0	—	1 0 0	275,000	Queensland	13, Basinghall-st E.C
Mount Zeehan	-/6 1/-	1/-	1 0	—	1 0 0	193,257	Tasmania	Mansion Ho. Cham.
New Queen ... G	8/9 9/3	10/3	1 0	-/6 Apr., '94	0 19 6	158,915	Queensland	30, St. Swithin's-la.
Port Phillip ... G	—	—	5 0	—	5 5 0	200,000	Victoria	57, Moorgate-st., E.C.
Queen's Bthdy Un	—	—	1 0	—	0 10 0	—	Victoria	7-8, Gt. Wnchster St.
Queens. Smelting	1/16 ⅛	3/16	1 0	—	1 0 0	36,244	Queensland	9, Tokenhouse Yard.
Scottish Australian	¾ ⅞	⅞	1 0	2% Apr. '94	1 0 0	200,000	N.S. Wales	Winchester Ho. E.C.
Sunburst	—	—	10/-	-/6 Mar. '92	0 10 0	150,000	Queensland	9, Tokenhouse Yard.
Tasmanian Crown	—	—	1 0	—	1 0 0	175,000	Tasmania	8, Old Jewry, E.C.
Tipperary	—	—	1 0	—	1 0 0	35,000	N. Zealand	3-5, Queen-st., E C.
True Blue	1/- 2/-	2/6	1 0	—	1 0 0	53,000	Australia	Leadenhall Blg. E.C.
Victoria	—	—	1 0	-/6 Mar. '94	1 0 0	144,000	Char. Towers	32, Gresham-st., E C.
Victory ... G	⅛ ⅜	11/16 xd	5 0	—	0 5 0	200,000	Queensland	32, Gresham-st., E.C
Waihi ... G	1¾ 1¾xd	1⅝ xd	1 0	1/- Jan. '94	1 0 0	150,000	New Zealand	11, Abchurch-ln. E.C
Wentworth Ord. G	5/- 6/-	7/-	1 0	6/- Jan. '93	1 0 0	500,000	N. S. Wales	4-6, Throgmort. Av.

INDIAN AND ASIATIC MINES.

Name.	Closing Price, Apr. 20, 1894	Closing Price, Apr. 13, 1894.	Par.	Latest Dividend	Called up Per Share.	Shares Issued.	Situation of Mine.	Head Office.
Balaghat Mysore G	8/6 9/6	—	1 0	—	0 17 0	160,000	India	6-7, Queen-street-pl.
Burma Ruby ... R	3/9 4/3	5/-	1 0	—	0 16 0	300,000	Burmah	Suffolk House, E.C.
Champion Reef ... G	3⅝ 3⅞xd	3⅞ xd	1 0	—	1 0 0	200,000	India	6-7, Queen-street-pl.
Colar Central ... G	-/4½ -/7½	-/7½	1 0	—	1 0 0	200,000	India	Dashwood Ho., E.C.
Coromandel ... G	¼ 5/16	5/16	1 0	—	0 12 6	120,000	India	6-7, Queen-st.-place.
Devâla Moyar ... G	—	—	1 0	—	1 0 0	200,000	India	34, Nicholas-lane.
Gemming & Mining	—	—	2 0	—	1 7 6	24,456	Ceylon	183, Gresham House.
Gold Flds Mysore G	21/- 22/-	25/6	1 0	1/- July '93	1 0 0	220,000	India	6-7, Queen-street pl.
Gold Flds Siam G	—	—	1 0	—	1 0 0	150,000	Siam	19, St. Swithin's-lane.
Hyderabad Dec.	—	—	10 0	—	10 0 0	1,000,000	Deccan	16, St. Helen's-place.
Kempinkote GdFd	1/7½ 1/10½	2/-	5 0	—	0 3 0	698,650	India	6-7, Queen-st.-place.
Mysore ... G	2⅝ 3	3	1 0	3/- Mar. '94	1 0 0	225,000	India	6-7, Queen-street pl.
Mysore Reefs ... G	11/- 12/-	10/6	1 0	—	0 19 0	200,000	India	6-7, Queen-street-pl.
Mysore West ... G	3/9 4/3	4/9	1 0	—	1 0 0	130,000	India	Dashwood Ho., E.C.
Mysore Wynaad G	1/3 1/9	2/-	1 0	—	1 0 0	250,000	India	Dashwood Ho., E.C.
Nine Reefs ... G	2/3 2/9	2/9	10/-	—	0 10 0	250,000	India	6-7, Queen-street-pl.
Nundydroog ... G	24/- 26/-	1⅜	1 0	1/- Mar. '94	1 0 0	200,000	India	6-7, Queen-street-pl.
Ooregum (Df.O.) C	4⅞ 5	5	1 0	4/- Mar., '94	1 0 0	145,000	India	6-7, Queen-street-pl.
Do. (10% Pref.).	5⅛ 5⅜	5⅜	1 0	4/- Mar., 94	1 0 0	120,000	India	6-7, Queen-street-pl.
Pahang Corpn.	2/6 3/6	3/6	1 0	15% Apr. '89	1 0 0	200,000	Malay Penin.	Blomfield Ho., E.C.
Pahang Kabang	—	—	1 0	—	1 0 0	394,740	Malay Penin.	4a, Jeffrey's-sq., E.C.
South E. Mysore G	5/- 5/6	5/9	4/-	—	0 3 9	133,074	India	6-7, Queen-street-pl.

EUROPEAN MINES.

Name.	Closing Price, Apr. 20, 1894	Closing Price, Apr. 13, 1894.	Par.	Latest Dividend	Called up Per Share.	Shares Issued.	Situation of Mine.	Head Office.
Alamillos ... L	⅜ ⅝	⅝	2 0	-/3 Sept. '92	2 0 0	35,000	Spain	6, Queen-street-place
Argentella ... C	—	—	1 0	—	1 0 0	123,165	Corsica	16, Philpot-lane.
Bratsberg ... C	—	—	1 0	—	1 0 0	120,000	Norway	1, Gresham-buildings
English Cr. Spelter	⅜ ⅞	⅞	1 0	5% Dec. '92	1 0 0	84,000	Lombardy	9, Queen-street-place
Fortuna ... L	⅜ ⅞	⅞	2 0	-/6 Sept. '92	2 0 0	25,000	Spain	6, Queen-street-place
Libiola ... C	3 3¼	3¼	5 0	5/- Mar. '94	5 0 0	50,400	Italy	Dashwood Ho., E.C.
Linares ... L	3 3¼	3⅛	3 0	4/- May,'9	3 0 0	15,000	Spain	6, Queen-street-place
Marbella ... I	61/6 62/6	62/6	10 0	6/- Mar. '93	10 0 0	25,000	Spain	78, Queen Victoria-st.
Mason & Barry ... C	2⅝ 2⅞	2⅝	5 0	2/- May. '9	5 0 0	185,172	Portugal	87, Cannon-street.
Oscar ... G	—	—	5 0	—	0 4 6	117,240	Norway	6A, Austin Friars.
Pestarena ... G	2/- 2/6	2/6	3 0	—	3 0 0	67,509	Italy	6-7, Queen-street-pl.
Pontgibaud ... L	10 12	12	20 0	11/5 Dec.'93	20 0 0	14,000	France	6-7, Queen-street-pl.
Rio Tinto ... C	15⅛ 15¼	15⅛	10 0	7/- Apr.,'94	10 0 0	325,000	Spain	30, St. Swithin's-lane
Do. (Mort. Bonds)	103 104	104	100 0	5% Apr. '94	100 0 0	2,158,960	Spain	30, St. Swithin's-lane
Do. (2nd do.)	101 102	102	100 0	5% Apr. '94	100 0 0	1,127,180	Spain	30, St. Swithin's-lan
Sipanji ... AQ	8/6 9/6	10/-	1 0	—	0 19 0	85,000	Servia	120, Bishopsgt-st. Wn.
Tharsis ... C Sul	4⅛ 5	5	2 0	12½% Mar. '94	2 0 0	625,000	Spain	Glasgow.
West Prussian Pre.	10 10¾	10¾	10 0	8% Mar. '94	10 0 0	5,450	Germany	Walbrook Ho., E.C.
West Prussian Or.	16 16	16	10 0	8% Mar. '94	10 0 0	14,050	Germany	Walbrook Ho., E.C.

NORTH AMERICAN MINES.

Name.	Closing Price, Apr 20, 1894	Closing Price, Apr. 13, 1894.	Par. £ s.	Latest Dividend.	Called up per Share. £ s. d.	Shares Issued.	Situation of Mine.	Head Office.
Almada and T... S	-/3 -/9	-/9	2/6	—	0 2 6	351,008	Mexico	6, Queen-street-place
American Belle ... S	1/9 2/3	2/3	1 0	-/6 Mar. '91	1 0 0	400,000	Colorado	25A, Old Broad-street.
Big Creek	—	—	1 0	1/- Dec. '91	1 0 0	80,098	Nevada	2, Pancras-lane, E.C.
California	—	—	10/-	-/6 May 90	0 8 9	129,571	Colorado	St. George's Ho E.C.
Canadian Phos. P	¼ ⅜	⅜	1 0	-/6 Nov,'90	1 0 0	73,334	Canada	155, Fenchurch-st.
Chiapas	—	—	1 0	—	1 0 0	221,876	Mexico	33, Broad-st. Av. E.C.
Colorado Silver ... S	—	—	1 0	—	1 0 0	112,491	Colorado	Abchurch-chbrs. E.C
Cortez	—	—	1 0	3% Feb. '93	1 0 0	300,000	Nevada	Suffolk House, E.C.
De Lamar ... GS	20/- 22/-	23/-	1 0	1/- April 94	1 0 0	400,000	Idaho	6, Draper's-gardens.
Dickens Custer GS	— -/3	-/3	1 0	—	0 19 9	420,000	Idaho	Winchester Ho. E.C.
Elkhorn ... S	11/- 12/-	12/- xd	1 0	-/9 Mar. '94	1 0 0	175,007	Montana	6, Draper's-gardens.
Emma ... S	-/3 -/6	-/6	5 0	—	0 5 0	367,788	Utah	15, Geo-st, Mansn. Ho
Flagstaff ... S	-/3 -/6	-/6	1 0	—	0 18 3	240,000	Utah	Dashwood Ho., E.C.
Garfield ... GS	—	—	1 0	-/6 Dec. '88	0 19 6	98,185	Nevada	Suffolk House, E.C.
Golden Feather G	7/- 7/6	8/-	1 0	—	1 0 0	180,000	California	St. Stephens Cs E.C.
Golden Gate	5/6 6/6	6/6	1 0	—	0 19 0	79,600	California	St. Stephens Cs E.C.
Golden Leaf ... G	-/9 1/3	1/3	1 0	—	1 0 0	300,259	Montana	8, Draper's Gardens.
Golden Valley ... G	—	—	1 0	—	1 0 0	55,507	Colorado	15, Angel Court
Harquahala ... G	⅞ 15/16	18/6	1 0	-/6 Apr. '94	1 0 0	300,000	Arizona	6, Draper's Gardens.
Holcomb Valley G	1/3 1/6	1/6	5 0	-/9 Oct. '93	0 5 0	300,000	California	14, Cornhill E.C.
Idaho ... GS	1/8 1/10	1/10½	1 0	—	0 4 8	143,439	Idaho	140, Leadenhall-st.
Jackson Goldfields	—	—	5 0	—	0 5 0	408,635	California	6, Drapers' Gardens.
Jay Hawk ... G	6/- 7/-	7/6	1 0	-/6 Dec. '92	1 0 0	285,000	Montana	Dashwood House.
Kohinoor "B" GS	—	—	1 0	-/6 June.'81	1 0 0	112,901	Colorado	Blomfield Ho., E.C.
La Plata ... S	-/6 -/9	-/9	5/-	1/3 Oct. '82	0 4 3	405,000	Colorado	11, Poultry, E.C.
Maid of Erin	—	—	1 0	4c. psh Mar.'94	1 0 0	575,000	Colorado	43, Threadneedle-st.
Mammoth Gold	—	—	1 0	—	1 0 0	400,000	Pinal Arizona.	257, Winchester Ho.
Mesq. d'l Oro (P) G	½ 1	1	5 0	—	5 0 0	10,000	Mexico	Dashwood Ho., E.C.
Mesq. d'l Oro (D) G	¼ ⅜	⅜	5 0	—	5 0 0	10,000	Mexico	Dashwood Ho., E.C
Montana	5/9 6/3	6/9	1 0	5% April '91	0 19 0	657,150	Montana	Gresham House, E.C
New Colorado	—	—	1 0	—	0 17 0	65,000	Colorado	Abchurch Cham E.C
N. Consolidated SC	—	—	1 0	—	1 0 0	160,000	Eberhardt, U.S	19A, Coleman-street.
N. Eberhardt ... S	—	—	5/-	—	0 3 6	248,576	Nevada	15, Angel-court, E.C.
N. Gold Hill ... G	—	—	1 0	—	0 19 9	191,045	N. Carolina	15, George-st., E.C.
New Guston ... S	5/16 7/16	6/6	1 0	1/- Oct. '92	1 0 0	110,000	Colorado	25A. Old Broad-st.
New London	—	—	2/6	—	0 2 6	327,816	New Carolina	55, Bishopsgt-st. Wn.
N. Hoover Hill ... G	—	—	10/-	-/9 Dec. '85	0 10 0	120,000	N. Carolina	Langthorne Ho., E.C
Palmarejo ... GS	1/3 1/9	1/9	1 0	—	1 0 0	418,888	Mexico	4, Copthall-buildings
Pinos Altos (N) GS	5/6 6/6	5/6	1 0	-/6 Mar.'90	1 0 0	160,000	Mexico	110, Cannon-street.
Pittsbg Con. (N) G	—	—	1 0	1/6 Mar. '88	1 0 0	77,147	Nevada	Suffolk House, E.C
Poorman Con.	7/- 7/6	7/6	5/-	—	0 5 0	273,948	Idaho	5, Copthall-bgs. E.C
Red Mountain ... S	—	—	1 0	—	1 0 0	46,686	Colorado	11, Poultry, E.C.
Richmond ... GSL	¼ ⅜	½	5 0	1/- Sep. '93	5 0 0	54,000	Nevada	44, Coleman-street.
Ruby ... GSL	—	—	5/-	—	0 5 0	221,371	Nevada	22 St. Mary Axe.
Sierra Buttes ... G	8/9 11/3	9/16	2 0	-/6 Oct. '93	2 0 0	122,500	California	138, Leadenhall-st.
Do. Plumas Eur. G	⅜ ¾	¾	2 0	-/9 Oct. '93	2 0 0	140,265	California	138, Leadenhall-st.
Springdale ... G	2/3 2/9	3/- xd	$1	16⅔% Dec. '92	$1	1,000,000	Colorado	20, Abchurch Lane.
United Mexican S	1/- 1/6	1/6	1 0	2/6 May, '87	1 0 0	906,654	Mexico	3, Gt. Winchester-st.
Viola (New)	—	—	1 0	—	1 0 0	150,000	Idaho	Broad-st. House, E.C.

SOUTH AND CENTRAL AMERICAN MINES.

Name.	Closing Price, Apr 20, 1894	Closing Price, Apr. 13, 1894.	Par.	Latest Dividend.	Called up per Share.	Shares Issued.	Situation of Mine.	Head Office.
Antio. (Pref.) G.S.	—	—	1 0	-/6 Mar. '90	1 0 0	22,458	Colombia	184, Gresham House
Antioquia (ordiny)	—	—	1 0	—	1 0 0	42,453	Colombia	184, Gresham House
Callao Bis ... G	1/- 1/3	1/4½	1 0	—	1 0 0	320,000	Venezuela	50, Old Broad-street.
Camarones ... C	—	⅜	2 0	—	2 0 0	67,000	Chili	123, Bishopsgt. Wn.
Caratal ... G	-/8 -/9	-/10	2 6	—	0 2 4	657,326	Venezuela	57, Moorgate-st. E.C
Colon ... G	-/6 1/-	1/-	1 0	—	1 0 0	200,000	Colombia	5, Copthall-bdgs., E.C.
Colorado Nit. ... N	3⅛ 3⅜	3⅜	5 0	7/6 May, '89	5 0 0	32,000	Chili	12, King-st., Liverp'l.
Colombian Hy. ... G	¾ 13/16	13/16	1 0	1/- April '94	1 0 0	75,000	Colombia	10, Blomfield-street.
Copiapo ... C	1 11/16 1 13/16	1 13/16	2 0	2/- Dec. '93	2 0 0	100,000	Chili	Dashwood House, E.C.
Darien ... G	2/- 3/-	3/-	1 0	—	1 0 0	71,359	Colombia	Manchester.
Don Pedro ... G	¼ 5/16	6/6	1 0	—	1 0 0	133,102	Brazil	24-5, Devonsh. Cs E.C.
El Callao ... G	1 1¼	-/1¼	5 0	2 frs. Nov,'90	5 0 0	257,600	Venezuela	8, Bishopsgt.-st, Wn.
Frontino & B. ... G	15/16 1	20/-	1 0	1/6 Dec. '93	0 19 6	128,662	Colombia	184, Gresham House.
Glenrock ... G	2/- 2/6	3/-	1 0	—	0 16 6	199,948	Argen. (& Ind)	3-5, Queen-street, E.C
Glenrock (Pref.)	—	—	1 0	—	0 16 0	16,232	Argen. (& Ind)	3-5, Queen-street, E.C
Gravel ... G	6/- 7/-	7/-	1 0	—	0 19 6	100,000	Colombia	10, Blomfield-street.
Javali ... G	—	—	2/-	8½% '91	0 2 0	105,234	Nicaragua	139, Cannon-street.
Julia Nit. ... N	3/- 5/-	5/-	5 0	—	5 0 0	30,000	Chili	79¼, Gracechurch-st.
Lautaro ... N	4⅛ 4⅜	4⅜	5 0	5/- Jan. '94	5 0 0	55,000	Chili	70, Gracechurch-st.
Liverpool ... N	—	—	5 0	10/- Feb. '94	5 0 0	22,000	Chili	Liverpool.
Loma ... G	1/- 1/3	1/3	1 0	—	1 0 0	300,000	Colombia	5, Copthall-building.
London Nit. ... N	—	—	3 0	4½ Nov. '89	5 0 0	10,000	Chili	9, Gracechurch-st.
London Nit. (Pref.)	—	—	5 0	11/- Nov.'94	5 0 0	22,000	Chili	9, Gracechurch-st.
Macate	2/- 3/-	3/-	2/-	—	0 1 0	—	Peru	11, Old Broad-st. E.C
Orita ... G	2/3 2/9	2/9	1 0	1/- April '89	1 0 0	30,000	Colombia	10, Blomfield-street.
Ouro Preto ... G	—	—	1 0	—	0 18 6	80,000	Brazil	6, Queen-street-place.
Panulcillo ... C	1/16 5/16	5/16	2 0	1/- Nov. '89	2 0 0	112,500	Chili	13, Great St. Helens
Primitiva ... N	4 4¼	4⅜	5 0	20% Oct. '89	5 0 0	40,000	Chili	Liverpool.
Quebrada ... C	¾ 1	13/16	3 0	5% Mar. '92	3 0 0	241,956	Venezuela	38, Nicholas Lane.
Rosario ... N	4 4¼	4¼	5 0	3/6 Feb. '94	5 0 0	120,000	Chili	57¼, Old Broad-street.
Rosario (5% Deb.)	—	—	100 0	6% Apr. '94	100 0 0	4,750	Chili	57¼, Old Broad-street.
St. John del Rey G	1 1⅛	24/-	1 0	10% June '82	1 0 0	273,435	Brazil	28, Tower-chmbrs, E.C
San Donato ... N	1¾ 2¼	2¼	5 0	—	5 0 0	32,000	Chili	12, King-st., Liverp'l.
San Jorge ... N	6 6¼	6¼	5 0	7/6 Oct. '93	5 0 0	75,000	Chili	9, Gracechurch-st.
San Pablo ... N	3⅛ 4	4	5 0	7½% Apr., '94	5 0 0	32,000	Chili	3, Gracechurch-st.
Santa Barbara ... G	—	—	10/-	1/3 Dec. '86	0 10 0	60,000	Brazil	Liverpool
Santa Luisa ... N	—	—	10 0	10/- Sep. '89	10 0 0	22,000	Chili	70, Gracechurch-st.
Santa Rita ... N	4¼ 4⅜	4	5 0	15% Apr., '94	5 0 0	20,000	Chili	Dashwood House, E.C
San Sebastian ... N	1⅛ 1⅜	1⅞	5 0	2/6 Feb. '94	5 0 0	29,000	Chili	Dashwood House, E.C
Segovia ... G	—	—	5 0	—	0 4 0	160,000	Colombia	5, Copthall-buildings
Tetuan ... G	—	—	1 0	—	0 19 6	200,000	Colombia	5, Copthall-buildings
Tolima "A" ... S	8¼ 8¾	8⅛	1 0	10/- Mar. '94	5 0 0	14,000	Colombia	18, Finsbury-circus.
Vic. & Altamira	—	—	5/-	—	0 5 0	200,000	Venezuela	Broad-st. Avenue.
W. Argentine ... G	2/9 3/3	3/-	1 0	—	0 19 0	150,000	Argentine	3-5, Queen-street.
West Indian ... G	—	—	5/-	—	0 5 0	700,000	San Domingo	49, Queen Victoria-st.
Zaruma ... G	—	—	5/-	—	0 6 0	261,422	Ecuador	1, Gt. Winchester-st.

AFRICAN MINES.

Name.	Closing Price, Apr 20, 1894	Closing Price, Apr. 13, 1894.	Par.	Latest Dividend.	Called up per Share.	Shares Issued.	Situation of Mine.	Head Office.
Africkander ... G	⅞ 1	1	1 0	—	1 0 0	40,000	Transvaal	19, St. Swithin's-lane
Agnes Block ... G	½ ⅝	⅝	1 0	—	1 0 0	80,000	Transvaal	54, Old Broad-street.
Aurora ... G	7/16 9/16	9/16	1 0	5% Mar. '93	1 0 0	65,000	Witwatersrdt.	Johannesburg.
Aurora West, New G	⅝ 11/16	⅝	1 0	5% Mar., '93	—	85,000	Witwatersrdt.	1, Crosby Square.‡
Aurum ... G	—	—	1 0	—	—	75,000	Witwatersrdt.	32, Holborn Viaduct.
Balkis Land	2/6 3/-	2/9	10/-	—	0 10 0	520,000	Transvaal	85, Gracechurch-st.
Do. Eersteling	-/6 -/9	-/6	10/-	—	0 9 0	520,000	Transvaal	85, Gracechurch-st.
Banket ... G	-/9 1/3	1/3	1 0	—	1 0 0	200,000	Witwatersrdt.	Johannesburg.
Bantjes Reef ... G	14/- 15/-	16/-	1 0	—	1 0 0	95,000	Witwatersrdt.	Warnford-court.†
Barrett ... (New) ... G	2/6 3/-	3/3	1 0	—	0 9 0	235,358	De Kaap	17, Basinghall-street.
Bechuanaland Exp.	30/6 31/6	34/6	1 0	—	1 0 0	200,000	Bechuanaland	19, St. Swithin's-lane.
Blaauwbank Un. G	—	—	1 0	—	1 0 0	79,500	Witwatersrdt.	Johannesburg.
Cape Copper ... C	1 1¼	1⅛	2 0	1/3 June '93	2 0 0	300,000	Cape Colony	9, Queen-street-place.
Cen. Montrose ... G	2/- 3/-	3/-	1 0	—	1 0 0	149,000	—	10, Throgmorton Av.
Champ d'Or ... G	12/- 14/-	⅞	1 0	—	1 0 0	275,000	Witwatersrdt.	8, Old Jewry, E.C.
City and Suburb. G	13 13¼	13 3/16	1 0	25% Mar. '94	1 0 0	80,000	Witwatersrdt.	1, Crosby Square.‡
Coetzeestroom ... G	1/- 2/-	2/-	5 0	—	0 4 6	140,000	De Kaap	105, Leadenhall-street
Con. Bultfontein D	26/9 27/3	27/-	1 0	5% Nov. '89	1 0 0	721,500	Griqualand W	62, Lombard-st.
Con. Deep Levels G	1⅞ 1 15/16	1 15/16	1 0	—	1 0 0	187,250	Transvaal	30, St. Swithin's-lane.
Crœsus (New) ... G	1⅜ 1⅝	1⅜	1 0	5% May,'92	1 0 0	35,000	Witwatersrdt.	66, Gresham-street.
Crown Reef ... G	8⅞ 9⅛	10	1 0	25% Oct.'93	1 0 0	120,000	Witwatersrdt.	23, Austin Friars.‡
De Beers Consol. D	16⅞ 16⅝	17⅛	5 0	12/6 Feb. '94	5 0 0	789,791	Transvaal	62, Lombard-street.
Do. 5½% 1st Deb.	105 106	106	—	5½% Feb. '94	—	—	—	—
Do. 5½% 2nd Deb.	104½ 105½	105½	—	5½% Jan. '94	—	—	—	—
Durban Roodept. G	5⅛ 5¼	6⅛	1 0	15% Mar. '94	1 0 0	125,000	Witwatersrdt.	28, Leadenhall-bldgs
Edwin Bray ... G	—	—	1 0	—	1 0 0	64,925	De Kaap	23, College-Hill.
Evelyn ... G	—	—	1 0	10% Jan. '89	1 0 0	66,000	Witwatersrdt.	28, Old Jewry, E.C.
Ferreira ... G	7⅛ 8	8⅜	1 0	50% Jan. '94	1 0 0	45,000	Witwatersrdt.	29, Holborn Viaduct.‡
Forbes Reef ... G	-/9 1/3	1/3	1 0	—	1 0 0	420,000	De Kaap	45-6, Leadenhall-st.
Geldenhuis Deep G	3 3⅛	3	1 0	—	1 0 0	265,000	Transvaal	30, St. Swithin's-lane.
Geldenhuis Est. G	5⅛ 5⅜	5⅜	1 0	10% Mar. '93	1 0 0	187,500	Witwatersrdt.	29 & 30, Hol. Viaduct.
George and May	21/- 23/-	26/-	1 0	—	—	105,000	Witwatersrdt.	Warnford Court, E.C
George Goch ... G	—	—	1 0	—	1 0 0	100,000	Witwatersrdt.	Johannesburg.
Glencairn ... G	32/- 35/-	36/8	1 0	—	1 0 0	200,000	Witwatersrdt.	2, Drapers-gardens.
Gold Estates T. ... G	3/6 4/6	4/8	1 0	15% Dec. '89	0 10 0	130,000	Transvaal	46, Queen Victoria-st
Grahamstown ... G	10/- 11/-	10/6	1 0	—	1 0 0	150,000	Witwatersrdt.	14, Throgmorton-st.
Graskop ... G	-/9 1/3	1/3	0 5	2½% Mar. '93	0 4 6	500,000	Lydenburg	85, Gracechurch-st.
Great Britain ... G	—	—	1 0	—	1 0 0	170,000	Witwatersrdt.	Warnford-court.
Griqualand W. ... D	6 11/16 6 13/16	6 11/16	10 0	—	10 0 0	105,700	Transvaal	62, Lombard-street.
Henry Nourse ... G	2⅝ 3	3	1 0	—	1 0 0	100,000	De Kaap	Warnford-court.‡
Heriot (New) ... G	3⅞ 4	3⅝	1 0	—	—	86,000	Witwatersrdt.	1, Crosby Square.‡
Hill's Waterfall ... G	—	—	1 0	—	0 18 0	93,334	De Kaap	3, Lothbury, E.C.

"THE MINING JOURNAL" SHARE LIST (African Mines continued).

Name.	Closing Price. Apr. 20, 1894.	Closing Price. Apr. 13, 1894.	Par.	Latest Dividend.	Called up Per Share.	Shares Issued.	Situation of Mine.	Head Office.
			£ s.		£ s. d.			
Joe's Luck.....G	1/8 2/6	2/6	1 0	—	1 0 0	57,404	De Kaap	11, Queen Vic.-st.
Jubilee .....G	5 15/16 6 1/16	6 1/16	1 0	30% Apr. '94	1 0 0	30,000	Witwatersrdt.	8, Old Jewry.†
Jumpers .....G	3 7/8 4	4 1/2	1 0	10% Jan. '93	1 0 0	100,000	Witwatersrdt.	29, Holborn Viaduct.†
Kleinfontein . G	27/6 30/-	1 3/4	1 0	—	1 0 0	150,000	Witwatersrdt.	8, Old Jewry.
Klerksdorp ....G	1/3 1/9	1/9	1 0	—	1 0 0	150,007	Transvaal	110, Cannon-street.
Knight .....G	16/- 17/-	17/-	1 0	—	1 0 0	250,000	Witwatersrdt.	19, Bury-street, E.C.
Langlaagte Est. G	4 3/4 4 5/8	4 5/8	3 0	12½% Mar. '94	1 0 0	467,000	Witwatersrdt.	69, Holborn Viaduct.†
Lisbon-Berlyn ...G	3/- 4/-	4/6	2 6	—	0 1 6	889,233	Lydenburg ...	110, Cannon-street.
Luipaards Vlei Est.	11/- 11/8	13/-	1 0	6% Mar. '90	1 0 0	344,003	Witwatersrdt.	8, Old Jewry.
Main Reef .....G	1 1 1/4	1 1/8	1 0	—	1 0 0	300,000	Witwatersrdt.	Warnford-court.†
Manica Ophir	—	—	1 0	—	1 0 0	96,000	Mozambique..	2, Pinner's Court.
May Consol. .....G	10/6 11/-	11/-	1 0	—	1 0 0	430,000	Witwatersrdt.	4, Lothbury.†
May Deep Level G	8/- 10/-	9 1/16	1 0	—	1 0 0	146,000	Witwatersrdt.	33, Cornhill, E.C.
Metropolitan.....G	1 5/16 1 6/16	1 5/16	1 0	—	1 0 0	75,000	Witwatersrdt.	1, Crosby Square.†
Meyer & Charl....G	5 1/2 5 7/8	5 15/16	1 0	25% Dec. '93	1 0 0	71,687	Witwatersrdt.	Warnford-court.†
Mitchell .....G	—	—	1 0	—	1 0 0	45,000	Witwatersrdt.	Kimberley.
Modderfontein .. G	6/8 7/8	8/6	1 0	—	1 0 0	200,000	Witwatersrdt.	Warnford-court.†
Moodies G.&E....G	8/- 9/-	9/-	1 0	-/4 May '90	1 0 0	240,000	De Kaap	8, Old Jewry.†
Moodies (15/- p.)G	4/- 5/-	5/-	1 0	—	0 15 0	120,000	De Kaap	8, Old Jewry.
Namaqua C	1 3/16 1 5/16	1 5/16	2 0	2/6 July '91	2 0 0	194,351	Namaqualand.	34, Leadenhall-bldg.
New Chimes..... G	1 15/16 1 15/16	1 7/8	1 0	—	1 0 0	70,000	Witwatersrdt.	8, Old Jewry, E.C.
New Cresus..... G	1 1/2 1 5/16	1 5/16	1 0	5 % Aug. '92	1 0 0	195,000	Langlaagte ..	4, Bishopsgt.-st. Wt.
New Jagersf. ....D	16 1/16 16 5/16	17	10 0	5% Mar., '94	10 0 0	100,000	Transvaal	5, Copthall-buildings
New Primrose ...G	2 15/16 3 1/16	4 5/8	1 0	4/- July, '93	1 0 0	230,000	Witwatersrdt.	2, Draper's-gardens.
Nigel .....G	—	—	1 0	—	1 0 0	160,000	Witwatersrdt.	1, Crosby-square.
Noitgedacht E. G	—	—	1 0	—	1 0 0	160,000	Lydenburg ...	8, Old Jewry.
Oceana	2 1/4 2 3/4	2 3/4	1 0	25/- Nov. '89	1 0 0	150,000	Transvaal	4, Sun Court, E.C.
Ophir Concess.	1/3 1/9	1/6	1 0	—	0 18 6	111,357	E. CoastAfrica	31, Lombard-street.
Orange F.S.E. ....D	4 1/4 4 3/4	5 1/4	1 0	—	1 0 0	284,000	OrangeF.State	10, Moorgate-street.
Oriental .....G	1/6 2/-	2/-	1 0	—	1 0 0	443,450	De Kaap	Jamaica-bgs.Cornhill
Otto's Kopje.....D	2/3 2/9	2/9	1 0	—	0 19 3	500,000	Kimberley ...	113, Cannon-st.,E.C.
Paarl Central... G	1 5/16 1	1	1 0	—	1 0 0	138,750	Transvaal	29-30, Hol. Vis., E.C.

Name.	Closing Price. Apr. 20, 1894.	Closing Price. Apr. 13, 1894.	Par.	Latest Dividend.	Called up Per Share.	Shares Issued.	Situation of Mine.	Head Office.
			£ s.		£ s. d.			
Piggs Peak, New G	3/- 4/-	4/-	1 0	—	0 16 6	230,326	Swaziland ...	6, Queen-street-place
Potchefstroom ... G	2/- 3/-	3/-	1 0	—	1 0 0	161,000	Potchefstroom	19, Bury-st., E.C.
Princess Estate G	22/- 24/-	25/-	1 0	—	1 0 0	72,046	Witwatersrdt.	33, Cornhill, E.C.
Randfontein .....G	15/6 16/-	13/9	1 0	—	1 0 0	1,966,500	Witwatersrdt.	69, Holborn Viaduct.†
Read's Drift .....D	9/- 10/-	10/-	1 0	—	—	50,000	Transvaal	19, Finsbury-circus.
Robinson .....G	5 1/4 6	6	5 0	4% June '93	5 0 0	542,750	Transvaal	65, Holborn Viaduct.†
Roodepoort Un. G	—	2 5/16	1 0	—	1 0 0	100,000	Witwatersrdt.	Warnford-court.†
St. Augustine ...D	—	—	1 0	—	1 0 0	465,000	Griqualand W	30-1, St. Swithin's-la
Salisbury New ...G	2 3/4 2 3/4	2 3/4	1 0	—	1 0 0	93,000	Witwatersrdt.	1, Crosby-square.†
Sheba .....G	25/9 26/3	27/-	1 0	-/6 April '94	1 0 0	614,450	Lydenburg ...	85, Gracechurch-st.
Silati .....G	3/9 4/3	4/3	1 0	—	1 0 0	625,000	Zoutpansberg.	4, Sun Court, E.C.
Simmer & Jack...G	6 1/16 6 5/16	6 1/16	1 0	10% Nov '92	1 0 0	85,000	Witwatersrdt.	33, Cornhill.
S.A. Gold Trust ...	19/- 20/-	1	1 0	10% April '93	0 10 0	220,000	South Africa..	8, Old Jewry.
Spitzkop.....G	2/9 3/3	2/9	1 0	—	1 0 0	144,531	Lydenburg ...	15, Bishopsgt-st, Wt.
Stanhope .....G	1¾ 1 15/16	1⅞	1 0	50% May. '93	—	34,000	Witwatersrdt.	1, Crosby Square.†
Sutherland R. ...G	4/- 4/6	5/3	1 0	—	0 18 0	220,000	Zoutpansberg.	3, Budge-row, E.C.
Teutonia.....G	—	—	1 0	—	1 0 0	96,000	Witwatersrdt.	8, Old Jewry.
Trans. Coal Trust...	12/6 13/6	11/9 xd	1 0	-/6 Oct, '93	1 0 0	439,965	Witwatersrdt.	Broad-st. House, E.C
Trans. Est. & Dev.	10/6 11/6	11/-	1 0	—	1 0 0	285,700	Transvaal	76, Old Broad-st. E.C.
Trans. Gold .....G	38/6 39/-	39/-	1 0	1/- Dec, '92	1 0 0	250,000	Transvaal	Suffolk House, E.C.
Trans. Land (15/-)	2/9 3/5	4/-	1 0	—	0 15 0	169,999	Transvaal	33, Cornhill.
Un. Ivy Reef.....G	17/6 20/-	20/-	1 0	—	1 0 0	45,000	Transvaal	110, Cannon-street
Un. Langlaagte ...	12/6 15/-	15/-	1 0	—	1 0 0	100,000	Witwatersrdt.	23, St. Swithin's-la.
Van Ryn ..... G	12/6 15/-	15/-	1 0	—	1 0 0	99,810	Witwatersrdt.	1, Crosby-square.†
Victory Hill .....G	—	—	1 0	—	1 0 0	108,000	De Kaap	Portland House, E.C.
Village Main Reef	4 4 1/4	4 1/2	1 0	—	1 0 0	132,000	Witwatersrdt.	8, Old Jewry.
Virginia .....G	3/3 3/9	—	1 0	—	1 0 0	48,335	Transvaal	26, Budge-row, E.C
Vogelstruis .....G	—	—	1 0	—	1 0 0	150,000	Witwatersrdt.	34, Leadenhall-bldgs.
Wemmer .....G	4½ 4 3/8	5	1 0	10% Nov. '91	1 0 0	55,000	Witwatersrdt.	19, Bury-street.†
Witwatersrandt ...	—	—	1 0	—	1 0 0	250,000	Witwatersrdt.	19, Bury-st., E.C.
Wolhuter .....G	3 1/4 3 1/2	3 1/2	1 0	2/- Apr., '94	1 0 0	120,000	Witwatersrdt.	Warnford-court.†
Worcester .....G	2 2 1/4	2 1/4	1 0	10% May '94	1 0 0	90,727	Witwatersrdt.	8, Old Jewry.†
Zwartland Land ..	—	—	1 0	—	0 16 0	150,000	Transvaal	19, Birchin-lane, E.C.

LATEST FROM THE MINES.

CABLEGRAMS AND TELEGRAMS.

GUADALCAZAR QUICKSILVER.—The quantity of quicksilver drawn off during the week ending April 12, as cabled from the mines, amounts to 3200 lbs., equal to 30⅔ flasks, from one furnace only. The second furnace has been repaired, and was restarted on the 14th instant.

JOHANNESBURG PIONEER.—Output for month of March, 824 ounces of gold.

JUMPERS.—A cablegram has been received from the head office at Johannesburg, stating the following results for last month (March):—"Crushed 9039 tons; obtained 4144 ounces of gold; and concentrates equal to 595 ounces of gold; total, 4739 ounces of gold; profit, £5300."

MYSORE REEFS.—The directors have received a cablegram from the mine, dated 14th April, as follows:—"Vertical shaft. The lode in face of drive is well defined and of a promising nature, carrying ore 9 inches wide, of good quality."

NERBUDDA COAL AND IRON.—The sales of coal for the month of February last amount to 1914 tons.

NEW QUEEN GOLD.—The directors have received the following cablegram, dated Charters Towers, April 14, giving result of crushing for past fortnight:—"240 tons, yielding 365 ounces gold. Will clean up on April 28 No. 4 formation. Shipping per *India* 910 ounces."

ORITA.—The directors have received the following cablegram from their superintendent relating to run No. 76:—"We have cleaned up £300, the profit on which is £150. We have recommenced washing."

OURO PRETO.—This company has received a cablegram from the mines giving the return for the month of March as follows:—"3124 tons produced 35,544 grammes, equal to 1143 ounces."

ROYAL SILVER MINES OF POTOSI.—The secretary has received cable advice that the production for March amounted to 30,340 ounces fine.

VICTORIA GOLD MINING ASSOCIATION (Charters Towers).—The following cablegram dated 17th inst. has been received at the London office:—"275 tons crushed yielded 475 ounces gold for two weeks to the 10th April, 1894."

WAIHI GOLD.—Bullion return for 28 days ending April 7, £5000 from 1750 tons.

NEW AURORA WEST.—Estimated profit milling and concentrates for March £630.

THE JUMPERS.—A cablegram has been received from the head office at Johannesburg, stating the following results for last month (March): Crushed, 9039 tons, obtained 4144 ounces of gold, and concentrates equal to 595 ounces of gold; total, 4739 ounces of gold. Profit, £5500.

WASSAU (Gold Coast).—The produce of the mine for the month of February last realised £1233 3s. 3d., being 316 ounces standard—the mill worked 20 days 7 hours, and crushed 270 tons of ore, giving a yield of 1 ounce 3 dwts. standard per ton. Cablegrams have since been received advising the remittances for last month as 497 ounces bullion, and a yield of 1 ounce 6 dwts. per ton. The manager reports that he hopes to have the additional milling power in working order this month.

EL CALLAO.—Messrs. Baring Brothers and Co. (Limited) have received the following telegram from El Callao Mining Company:—"576-600 ounces of gold produced by El Callao Mine for past fortnight, and 976-1000 ounces by the Colombia Mine."

ELKHORN.—Bullion produced in the mill for week ending 14th April, 9000 ounces.

ALADDIN'S LAMP.—The following cablegram has been received from the mines:—"215 tons of ore have been crushed during last fortnight, yielding 956 ounces of gold. We are now stoping on the 400 feet level; the vein is looking well. The Jackass shaft is now down 505 feet. In future will report monthly, as we find cleaning up fortnightly causes extra expense and loss of time."

QUEEN'S BIRTHDAY UNITED.—The following cablegram has just been received from Mr. W. J. Hansford, the company's local secretary, under date Dunolly, Victoria, the 20th April:—"Queen's Birthday: The mine has been completely unwatered to bottom of main shaft 850 feet.—Belgium and Perseverance Mine: Expect to strike the vein in a few days."

PAHANG CORPORATION.—The directors announce the receipt of cable from the mines giving further particulars of the output for the month of March as follows:—"In 18 days of 24 hours each 460 tons of stone were crushed, producing 40 tons 16 cwts. of tin oxide. 20 heads of stamps running, working costs $8750. An official note adds that on the basis of the last sales, the approximate value of the above output is $15,765·12, showing a profit over working expenses of $7015·12.

WAIHI GOLD.—The directors have received telegraphic advices that the main lode has been cut in the new level and has been driven on for a distance of 70 feet westwards. It is about 20 feet in width, and the face of the drift is looking first rate. The bullion return for the 28 days ending 7th inst. is £5000 from 1750 tons of ore.

BAYLEY'S REWARD.—The following cablegram has been received from Melbourne by London office:—"Manager telegraphs April 15: Week's run from two head of stamps, 500 ounces. Waiting escort, 1300 ounces. Mine looking very well, Gold showing all levels."

KABOONGA.—The following cablegram has been received from the manager at the mine:—"South west drive, 1113; south east drive, 1163. Borings in south east drive 136 difficult. Must be very near alluvial."

KAPANGA.—The directors have received the following telegram from the manager, Captain W. H. Argall, viz:—"During the month the shaft has been sunk 17 feet, making present depth 665 feet. We have cut several small veins in course of sinking, working with good prospects of success."

REVIEWS.

SOME LITERATURE ON OUR RAILWAYS.

Our Railways: Their Origin, Development, Incident, and Romance, by John Pendleton In two volumes. Cassell and Company (Limited), London, Paris, and Melbourne.

British Locomotives: Their History, Construction, and Modern Developments, by C. J. Bowen Cooke, Outdoor Assistant, London and North-Western Railway, Locomotive Department. London: Whittaker and Co., 2, White Hart-street, Paternoster-square, London, and New York.

Railways have become so indispensable a factor in modern life as to make it difficult to believe that their enormous growth has been accomplished within the past 60 years. Together with the weaving of the iron net-work over the country a literature has been created with its philosophy, its history, its biographies, its folk-lore. When an oratorical politico-economist desires to guage the progress of our commerce, he points triumphantly to the railways. When a patriarch, who has been left behind in the impetuous rush of our life, wishes himself back in the twenties, he shakes his head in unspeakable sorrow at the railways. Everything possible has been said about the railways. They have been loved and hated, venerated and despised, lauded and libelled. So much, indeed, has been written and spoken of them, that it might be refreshing, seeing they are always with us, if the subject were for a time allowed to drop. Nevertheless, at a period when the demand for railway books is increasing, we are pleased to welcome, by reason of their intrinsic merits, two works recently published, approaching the subject from widely differing standpoints. Mr. John Pendleton has set his well known name to two handsome volumes, abundantly illustrated, narrating in a light, sketchy manner, the origin, progress, and development of the railways, as they may be supposed to interest the mind unversed in technical matters. On the other hand, Mr. Bowen Cooke appeals, in a work upon British locomotives, more particularly to the engineering interest.

Mr. John Pendleton's work is striking for the breadth and variety of its treatment of the subject. Little of interest that ever happened upon any of the British lines has escaped his net. The narrative winds an ever-tortuous course, taking in assassination, accident, biography, incidents of a royal travel, and particulars of railway construction and management, never chaining the attention long to one subject, but always offering to the reader something new. A recommendation of the book is its style, which, despite some defects, is greatly suited to the matter it conveys. Clear and vivid at the same time, the writer's meaning is everywhere on the surface, and everywhere worth attainment. Additional force is lent to the description by the fact, always apparent, that it is founded upon personal experience. Mr. Pendleton probably belongs to the type of journalists, now fast disappearing whose custom it was to rise into the air in balloons, or sink into the sea in a diving dress, in order to be able to describe these novel conditions of life with all the advantages of personal experience. Occasional flashes of humour illumine the pages. When, for instance, the author remarks that "wholesome food and drink are occasionally sold in the refreshment room," the words bring to mind a strange medley of recollections, in which scalding coffee, pachydermitous rolls, and cast-iron pork pies mingle with the warning whistle of the guard. An objection has been taken to the work that it is made to include matters altogether foreign to its scope. The criticism implies the application of a standard of judgment which the author assuredly has never challenged. The purpose of the book is everywhere manifest, and a rigid adherence to the historical method is no part of it. "Their origin, development, incident, and romance," is the phrase with which the author supplements his title, and there is but little in the book not legitimately within the boundaries thus laid down. Our own criticisms would be directed first against the author's habit of frequently over-loading his sentences, and secondly, against his excessive use of what may be termed the present of narration, savouring somewhat of theatricalism. These faults, however, are referable, no doubt, to the writer's connection with journalism, and may very well be received with sympathetic quiescence. Defects of this kind should hardly be emphasised in a work avowedly of a light and anecdotal character, pleasing throughout, and written, undoubtedly, with the wish to amuse rather than to instruct. If we have judged the author's object aright, it must be fully allowed that he has admirably compassed it in these two attractive and readable volumes.

Mr. Bowen Cooke in the preface of his book expresses his wish to strike a medium between the technical and the non-professional phases of his subject. To many it will appear that he has inclined somewhat towards the former. There appears strong reason for doubting whether the "diagrams and the text will be easily understood without any previous technical training." This objection aside, the work is an admirable one, full and accurate, simple and graphic, written evidently by one who has had many years of experience in his subject. A couple of chapters at the commencement are devoted to the early history of the locomotive, and to the well-known Rainhill contest. Mr. Coope then proceeds to explain—and here his style is at its clearest and best—the elementary principles of the steam engine, passing thence to a detailed enumeration and description of the various parts of the engine, illustrated by some excellent diagrams and illustrations. Lastly, our author deals with the various types of locomotives, considered as a whole, the statistics of fuel consumption, and the duties of the driver and fireman. The chapters devoted to the last subject will to the lay reader be, perhaps, the most fascinating in the book. "It is no light matter," says the writer, "to be responsible for the safe conduct of an express passenger train through the country in the dead of night, at the rate of 50 or 60 miles an hour, past busy stations and mazy junctions." The tremendous responsibility attaching to such a position is at once patent, and there is also about it a fascination which justifies the elaborate description given of its cares and duties. The success which, in spite of the enormons inherent difficulty of the task, has attended Mr. Cooke's endeavours to put a difficult, though deeply interesting, subject into a semi-popular form is great. None of the many people who really feel drawn towards the subject will not be surprised at the high capacity for elucidation evidently possessed by the writer. He has accomplished his arduous work in a manner which enables us heartily to congratulate him upon having underdertaken it.

MAGNETIC DECLINATION AND ITS VARIATIONS.*

By Professor H. STROUD, M.A., D.Sc

THE variations that occur in the value of magnetic declination are either secular, annual, diurnal, or irregular. The secular variation is a slow change which takes place in the magnetic meridian. At London, in 1657, the declination was zero; that is, the magnetic needle, at that place and date, pointed due north and south, and since 1657 the needle has pointed to the west of true north. The declination reached its western maximum value in 1816, when it was 24½ degrees west; but it has now become smaller year by year, and at present just exceeds 17 degrees west.

The diurnal variation reaches its maximum westerly position at 1 p.m. daily, and its maximum easterly position at 10 p.m. in the northern hemisphere (and *vice versa* in the southern hemisphere). The daily variation is about 10 seconds; but it undergoes periodic changes.

Besides the preceding regular changes, the magnetic declination is subject to sudden irregular disturbances of greater or less amount, and when the variation is excessive the disturbance is known as a magnetic storm. Violent magnetic storms occurred in 1892; the most violent being that of February, commencing on the morning of the 13th, and reaching its most important phase between 11 p.m. and 2 a.m. on the 14th. At Paris and Kew the disturbances passed beyond the limits of both of the recording instruments, so that the maximum declination cannot be given; but a change of declination of 1 2-3rd degrees was recorded at Kew, and at Paris of 1 5-12th degrees. The occurrence of this magnetic storm was noted at the United States Naval Observatory, where the maximum disturbance was 1½ degrees.

Professors Rücker and Thorpe have recently completed a magnetic survey of the United Kingdom. They have determined the magnetic elements (declination, dip, and horizontal intensity) at numerous positions and various parts of the kingdom, and conclude that the notable disturbances recorded during their survey are due to the presence of crystalline rocks (especially basalt), either visible on the surface or concealed by superimposed masses of sedimentary strata.

* From a paper read before the North of England Institute of Mining and Mechanical Engineers.

MINERS' EIGHT HOURS BILL.—Strenuous efforts are being made by the Executive of the Miners' Federation to ensure the second reading of this Bill. Circulars have been sent to all mining districts urging them to send representatives to a meeting in London on the 24th inst. The meeting will send delegates to the lobbies of the House of Commons to interview their respective members, and district secretaries will invite every member to be in his place on the 25th. Each district will also prepare a petition praying Parliament to pass the Eight Hours Bill into law.

REPORTS FROM THE MINES.

*** We find it necessary to announce that, owing to the vast numbers of mining reports, and items of mining intelligence which reach us invariably very late—up to, and frequently after the time of going to press—it is impossible to guarantee the insertion of all of them in the issue in which, in ordinary course they should appear. We always endeavour, however, to make this important feature as complete as possible, and if the secretaries of mining companies, mining captains, and others would kindly make an effort to let their reports, etc., reach us early on Fridays, when it is not possible to let us have them earlier in the week, their doing so would go far to ensure their insertion, and to promote the completeness of our Mining Intelligence.*

BRITISH MINES.

DEVON GREAT CONSOLS.—Wm. Clemo, April 19: Wheal Anna Maria—Engine Shaft: In the stope in the bottom of the 110 level east the lode is yielding 10 tons of mundic per fathom. Cloake's stope in the bottom of the 110 fathom level east will yield 9 tons of mundic per fathom. Field Shaft, South Lode: The stope in the bottom of 130 west is worth 9 tons muudic per fathom. Wheal Josiah: Richards' Shaft: In the stope in the bottom of 103 east the lode will yield 10 tons mundic per fathom. Agnes Shaft: The stope in the back of the 103 west the lode is producing 4 tons copper and mundic ores per fathom. The stope in the back of the 90 fathom level west is also producing 4 tons copper and mundic ores per fathom. Thomas Shaft: The stope in the bottom of the 100 east is yielding 2 tons copper ore and 15 tons mundic per fathom. Lode in the stope in the bottom of the 100 east continues to yield 2 tons copper ore and 18 tons mundic per fathom. In the stope in back of 100 east the lode is yielding 2 tons copper ore and 14 tons mundic per fathom. In the stope in the back of the 150 east the lode will produce 1 ton copper ore and 6 tons mundic per fathom. The stope in the back of the 112 west is producing 2 tons copper ore and 3 tons mundic per fathom. The lode in stope in back of the 100 west will yield 6 tons mundic per fathom. New Shaft: New South Lode: The stope in bottom of 190 east is producing 7 tons mundic per fathom. The lode in stope in the back of the 130 fathom level east will produce 1 ton copper ore and 14 tons mundic per fathom.—Watson's Engine Shaft: In the 172 fathom level east the lode is 4 feet wide, composed of strong capel, with 1 ton copper and mundic ores per fathom. The 160 fathom level east is yielding saving work of copper and mundic ores. The lode in the 148 east is 3 feet wide, worth 2 tons copper and mundic ore per fathom. This end is for the present suspended to admit of the sinking a winze in the bottom of the level. The stope in the back of the 172 east is yielding 5 tons copper and mundic ores per fathom. The stope in the bottom of the 148 east is producing 4 tons copper and mundic ores per fathom. The stope in the back of the 148 east will produce 4 tons copper and mundic ores per fathom. In the lode in the back of the 136 fathom level west the stope is yielding 6 tons copper and mundic ores per fathom. The machinery throughout the mines is in good order, and working well.

DRAKEWALLS.—J. Hosking and T. Chapman, April 19:—During the week the shaftmen have sunk the engine shaft somewhat more than 3 feet. The lode in the 160 crosscut east of the engine shaft is less hard, yielding some mundic, but not enough to save. The lode is letting out some water, and from all appearances likely to improve as we advance through it. There is no other change.

GREEN HURTH.—April 13: Ore in stock March 16th, 62 tons 4 cwts.; ore raised for month, 32 tons; total, 94 tons 4 cwts.; ore delivered (deduct), 30 tons 16 cwts.; ore in stock, 63 tons 8 cwts.—Annie's Vein: At the south forehead the vein is nipped, and is not producing so well as previously reported, worth to-day 1½ ton per fathom. The heading above has improved for lead, and is worth 2 tons per fathom. The south drivage from the sump on the above vein continues to produce ore, worth 2½ tons per fathom. South-west branch above 30 level the south end is much poorer this week, worth only 1 ton per fathom. The north end is without change since my last report. The heading behind the south end is also poorer than usual, worth at present 1 ton per fathom; 13 bings 4 cwts. of ore have been delivered to Jacob Walton and Co. this week; this completes their parcel. Total quantity delivered is 15 tons 8 cwts.; 27 bings have also been delivered to Nenthead Company this week, which will complete their parcel. Total quantity delivered is 15 tons 8 cwts.

LEADHILLS.—W. H. Paull, April 16: Brown's Vein: The 160 fathom level south of Jeffrey's shaft is going forward in a large vein, worth at present 10 cwts. of lead ore per fathom. During the past few days the vein in the 160 fathom level north of Wilson's shaft has been of softer character, and contains scarcely any ore to-day. In the winze below the 145 north of Wilson's shaft the vein is producing 15 cwts. of ore per fathom. No. 1 stope over the 145 north of Wilson's shaft will yield 40 cwts. of ore per fathom. No. 2 stope over ditto north yields 30 cwts. of ore per fathom. The stope over the 130 north of Wilson's shaft will produce 30 cwts. of ore per fathom. The vein in the 115 fathom level north of Jeffrey's shaft is 5 feet wide, producing occasionally good stones of lead ore. In No. 1 stope over the 115 north of Jeffrey's shaft the vein will yield 30 cwts. of ore fathom. In No. 3 over the 115 north of Jeffrey's shaft the vein is worth 30 cwts. of ore per fathom. At the 100 fathom level driving south of Wilson's shaft the vein is over 4 feet wide, looks very promising, but as yet producing no ore to value. In the drift over the 100 south of winze the vein has fallen of considerably in its produce, and now yields only saving work. We trust, however, that it will soon improve again. The stope below the 100 north of Jeffreys shaft is producing 25 cwts. of ore per fathom. At the 85 fathom level south of Wilson's shaft the portion of the vein being driven upon is without any change of note. No. 1 stope over the 85 south of Wilson shaft is worth 50 cwts. of ore per fathom. No. 2 stope over same level south is worked out to the 70 fathom level. The vein in drift over the 85 north of winze is worth 35 cwts. of ore per fathom. The vein in No. 2 winze sinking below the 70, south of Wilson's shaft is 4½ feet wide, composed of kindly stone and spar, producing at times good stones of ore. After we have sunk another 12 feet here we purpose placing these men to cross cut east some 4 fathoms near the forebreast of the 70 south for proving a portion of vein standing in that direction. In the stope over the 50 south of winze the vein is 4 feet wide worth 70 cwts. of ore per fathom. The vein in stope below the 35 south of Flat Rod shaft will produce 90 cwts. of ore per fathom. The stope over same level south of Flat Rod shaft is yielding 25 cwts. of ore per fathom.—Sarrowcole Vein: Gripp's adit end going south of George's Roust vein looks promising, but there is no material change therein.

PRINCE OF WALES.—S. Roberts, J. Prowse, April 18: This morning the men in the crosscut struck something which may possibly be the lode. It is hard capel and spar, and water issuing freely from it. It will take them till to-morrow to cut further into it and see what it is like.

SOUTH FRANCES UNITED. April 17: Setting report The 285 fathom level to drive west of Pascoe's by six men and three boys with a boring machine at £7 per fathom. The lode producing low quality tinstuff. The 246 fathom level to drive west of Pascoe's by six men and three boys with a boring machine at £7 per fathom, lode worth £25 per fathom. A rise in back of this level by six men with a boring machine at £6 per fathom, lode worth £30 per fathom. Stope in back of this level is worth £13 per fathom. Stoping by 14 men at 4s. 6d. per ton. Stope in back of the 144 west of Grenville's is worth £10 per fathom. Stoping by six men at 3s. 6d. per ton. Stope in back of the 134 west of Grenville's is worth £11 per fathom. Stoping by 14 men at 5s. per ton. The 124 fathom level to drive west of Grenville's by four men at £10 per fathom, lode worth £12 per fathom. Stope in back of this level is worth £10 per fathom. Stoping by four men at 5s. per ton. Stope in bottom of the 114 fathom level west of Grenville's is worth £11 per fathom. Stoping by eight men at 3s. 3d. per ton. Daubuz's shaft to sink below the 100 fathom level to be carried 14 feet long and 7 feet wide by 18 men at £30 per fathom. We are still making good progress in the sinking of this shaft. In our tribute department we have 59 pitches working by 158 men on tributes varying from 9s. to 13s. 4d. in the £; the standard for tin being £42 per ton.—William Hooper, John Opie, Richard Williams, W. Hy. Richards.

WEARDALE.—Report on Weardale Company's mines for week ending April 14:—Groverake: Firestone drift east, vein about the same strength, but poorer in ore and slower to drive, worth 10 cwts. per fathom. Adamson's drift west, vein 2 feet wide of spar, and looking better for ore, worth 14 cwts. per fathom. Firestone drift west, strong sparry vein, but poor in ore, worth 6 cwts. per fathom. Sixty fathom level east, strong sparry vein, poor in ore and slow to drive, worth 6 cwts. per fathom; forehead stopped for the present. Groverake cubic fathom stope worth 14, 10, 10, 18, 14, 8, 12, 14, 12, 12, 12, and 8 cwts. per fathom. Boltsburn: The south flatt above Baty's crosscut looks more promising for ore, worth 16 cwts. per fathom. Forster's crosscut to north flatt, about the same for ore, but wanting in spar, worth 12 cwts. per fathom. Stopes above Watts' level in vein and south flatts, worth 20, 16, 34, 32, 26, 30, 16, and 24 cwts. per fathom. Greenlaws: Watson's drift under 6 fathoms Hazel, no change, end worth 8 cwts. per fathom. Nattrass Gill drift, vein is nipped; we are crosscutting north to see if there is any vein off. Stopes worth 12, 14, 14, 16, 15, 22, 18, and 12 cwts. per fathom. Lowe's drift, the rise in scar lime shows no change since last report. Lee's sump, stopes worth 18 and 20 cwts. per fathom.—Sedling: The 56 level is opened 103 2-6 fathoms east from drawing shaft. Level crushed about 10 feet wide, difficult to do. The crosscut north from bottom of shaft is in 12 5-6 fathoms. The flatt continues strong, chiefly very hard rider and quartz, a little fluor, and some ore. The 64 level east has been driven 1 2-6 fathoms this week; vein 3½ feet wide, of good fluor spar, some rider mixed with ore, worth 20 cwts. per fathom. The 64 level west has been driven 1 2-6 fathoms this week; vein in plate, strait, composed of rider spar and some ore. Stopes in 64 level east and west worth 14, 14, 16, 16, 14, 12, and 12 cwts. per fathom. South vein stope worth 12 cwts. per fathom. Ore raised this week, 87 tons; ore dressed this week, 66 tons. No ores melted this week. Mill stopped to sweep chimney.

COLONIAL, INDIAN, AND FOREIGN MINES.

BRILLIANT BLOCK.—Mine manager's report for fortnight ending February 21:—No. 5 Level west, extended 21 ft.; total from shaft, 43 ft. The reef in the face is 5 ft. thick of medium quality. No. 5 Level East, extended 23 ft.; total length from shaft, 46 ft. The reef in present face is about 5 ft. thick of fair quality A leading stope has been started over each of these levels on 5 ft. of stone of fair quality. A pig-sty has also been built on each side of shaft, stull timber put in position, and truck roads laid down. We hope to be ready the end of this week to shift the pump down to No. 5 Plat, and shall then resume sinking the underlie shaft on Monday. No. 4 Level West, extended 11 ft. by contract; total from shaft, 37 ft. Reef in the face is 2 ft. thick of rather low quality. We are stoping over this level on a reef 2 feet 6 inches thick, of low quality. Have let a contract to sink a winze from No. 4 to 5 level west, 95 feet from shaft, 27 feet of which has been sunk. The footwall drive on No. 4 level east, extended 30 feet by contract; total from shaft, 291 feet; no stone in face at present. The hanging wall drive on this level, extended 17 feet; reef in face 2 feet thick, of good quality. We are stoping over these drives, on a reef varying from 6 inches to 2 feet 6 inches thick, of good quality.—No. 3 level east: We are stoping over this level in two stopes on about 20 inches of stone of good quality.—No. 1 level east: We are stoping over this level on 4 feet of stone of medium quality. Stone raised during the fortnight, 590 tons. Stone crushed at Bonnie Dundee Mill, 590 tons, for a yield of 808 ounces 6 dwts. 12 grains of gold.

CHAMP D'OR DEEP LEVEL.—The following extract is from the consulting engineer's report of work done on this company's property for the month of February: Vertical east main reef: The reef has again been cut in this level, and is 18 inches in thickness.—Main reef west: This has been further extended 20 feet, making a total distance of 203 feet from the shaft. A rise has been commenced to connect with the Midas incline; this is now at 37 feet.—Midas No. 1 level west main shaft: The main reef faulted at 183 feet from No. 1 fault, and has again been thrown south; 44 feet of cross cutting has been done.—No. 1 level west leader: 28 feet have been driven 185 feet from No. 1 fault. At this point the leader has been thrown south by the same fault which has thrown the main reef.—No. 2 level west main reef: 22 feet have been driven, making 121 feet from No. 1 fault. The reef averages 20 inches in width. No. 2 level on leader has been further extended 31 feet. The leader is about 2 inches wide, and pans fairly.—No. 3 level: No work has been done owing to the water.

NEW VIRGINIA.—The manager (Captain Hodge) writing under date 17th March, says:—I am sending a further small box of samples. Some I have marked just where a glass will show visible gold on several pieces sent. The others are average samples of what there is plenty to stope and send to mill. They have all been broken during the past week from the small trial pit and adit level inside of the mill in the Gold Enough claims. The ore or samples sent will speak for itself, and beyond the fact that I am proving in length and depth by sinking and driving, and by pannings daily showing excellent results, I have really nothing to add to my report of 2nd inst. The ore, as you will note, is almost identical with that from new trial shaft and Von Brandis generally. The latter mine has given every proof that it is a payable, good mine, and quite believe the Gold Enough will be quite as good as from the small amount of work I am able to put into it, it shows better than one could have expected. Experiments which I have made in taking samples and pannings down finely, and then washing in cyanide water, and then applying quicksilver, shows the results to be just the same as the Von Brandis ore showed—that there is a considerable quantity of actual gold (coated with iron, &c.) that the mercury will not touch, so that the tailings will be valuable and good to treat. And in a cablegram received 13th April Captain Hodge advises the board that he has entered into a contract for recutting the water race. Contract price, £400.

ANGLO-MEXICAN.—The Manager at the Mine writing under date March 1st, in reference to the Gold Mine at San José de Gracia, advises the early shipment from Mazatlan to San Francisco of 336 bags of gold ores, and on March 15th, that since his last report no change requiring special comment has taken place in the Guadalupe Tunnel so far as the width of the ore encountered in the "face" is concerned, while he was pleased to be able to report a further marked improvement over the previous week in the assay value of the pay streak on the "hanging wall" side of the vein. This streak measured 2 feet in width, and a sample taken yielded 8·9 ozs. per ton in gold, and 4·7 ozs. per ton in silver. He also states that he has on hand ready for shipment 15 tons of first-class ore, averaging from 45 to 50 ozs. per ton in gold.

AUSTRALASIAN.—Fortnightly report of Mr. John James, manager, dated March 1: In the underhand stope going north on the Orient reef the crushing stuff keeps as usual, and shows a little gold. In the stopes over the level going south the crushing stuff is getting less, but shows a little gold. The stopes over the 690 feet level show a little gold, with a fair body of crushing stuff. For the four weeks ending February 27 there were 332 tons of quartz raised and crushed, for a return of 217 ounces 18 dwts. 12 grains smelted gold. As the crushing plant will be handed over to the two Great Eastern to-day, we shall have to make arrangements with that company as to how they will let us have the stampers. I am not able to keep the ten head going constantly. If they would give us ten head for one month and five the other month, it would answer our requirements, I believe. Everything about the mine is in fair working order. There are thirty men employed.

GOLD FIELDS OF MYSORE.—Mine report for fortnight ending March 26: Oriental lode, south shaft: The 470 feet level north has been driven 3 feet, total length 73 feet 6 inches. Lode disordered; is split up into stringers of quartz assaying 11 dwts. 15 grains of gold per ton. 470 feet level south driven 4 feet 6 inches, total length 72 feet. Lode 1½ foot wide, assaying 1 ounce 18 dwts. 20 grains of gold per ton. Nothing has been done in the 380 feet level north owing to the contractor suddenly leaving with his coolies. We have now however succeeded in getting a fresh contractor. The 380 feet level south has been driven 4 feet 6 inches, total length 159 feet 3 inches. Lode 2 feet wide, assaying 18 dwts. 17 grains of gold per ton. The 280 crosscut east of shaft has been driven 3 feet 9 inches. Total length 214 feet 9 inches. No change in strata, still hard and spare for driving.—Prospecting work: The lode in the deeper developments at West Balaghat is still of a favourable character. I am sending a report on this work by this mail.

KEMPINKOTE.—Superintendent's report for fortnight ending March 27:—Garland's shaft has been sunk 11 feet, making a total depth of 147 feet 9 inches. There is a slight change in the rock—it is now more favourable for sinking. We are greatly troubled with the water, which is very quick, and is still a cause of hindrance to us. Henty's shaft has been sunk 5 feet, making a total depth of 174 feet. On the 23rd inst. the 173 feet level was started. It has been advanced 2 feet in a northerly direction.—Prospecting: The north drive from No. 5 pit has been advanced 18 feet, making a total of 30 feet. No. 6 pit, started on the 17th inst., has been sunk 31 feet.

PESTARENA UNITED.—Midmonthly Report: Ends: The 55 east on No. 1 lode is carrying about 75 centimetres of ore, and is estimated at 8 tons of 2 ounces 5 dwts. per fathom. The lode in the 70 east on No. 1 is 1 metre wide, and well defined. It carries a little pyrites of good quality in the roof, but not sufficient to value. The 70 west on No. 1 is still in disturbed ground, and no change can be expected until this has been passed through. The 70 west on A. and B. is not quite so good as when last reported, but shows signs of improvement. Its present value is estimated at 2 tons of 1 ounce per fathom.—Cross Cuts: The 70 north has passed through the cross course, and the present end is quite dry. The water coming through the cross course has not decreased. Nothing of importance has been met with in either the 130 or the 70 west crosscuts.—Stopes: The quantity and quality of the ore produced from these is fully as good as was reported on the 3rd instant.—Stabioli Mine: A little ore has again come in the roof of the Anza level north, and the lode is mixed throughout with small veins and small pyrites. All the ore that has been met with is of good quality, varying from 16 dwts. to 1 ounce 10 dwts. per ton. Machinery is all working satisfactorily, and at full speed. The water has been forked to 10 metres under the 140 sathom level.—(Signed) W. Henwood Trelease, T. Henry Messa.

SHEBA.—The following report has been received from the general manager for the month of February: Mine, above No. 5 Level: During the month no stoping has been done above No. 4 level, but the various stopes have been cleaned to enable us to renew prospecting in them. The stope west of No. 25 winze on No. 4 level is still producing fair milling ore. An ore chute has been constructed from No. 4 to No. 5 level, and loading station cut on No. 5 level to take the the ore broken in the west end of the mine; also that hoisted from below No. 5 level through No. 17 winze. Men are now putting down the incline track from No. 4 to No. 6 level, and also fitting up the sheave wheels to carry the shaft to the hoisting drum. The stope below the No. 5 level, No. 6 level has become much poorer of late. The west end of the No. 7 level was driven 20 feet during the month in very changeable ground. No. 2 crosscut driven 22 feet 6 inches in poor ground. No. 8 level west end driven 23 feet 6 inches in low grade ore. At No. 9 level we have commenced cutting the loading station on each end of the shaft in good ore. Incline shaft was sunk a further 26 feet, making 337 feet 6 inches below No. 5 level. During the month the rock has been very much mixed, sometimes being very rich and other times very poor.—Low level tunnel has been driven on at five different ends during the month, and has been extended 159 feet, making a total of 355 feet 6 inches in three months' work. The tunnel is 7 feet in height and 10 feet in width.

— Coromandel, Superintendent's Report for fortnight ending 24th March: The 420 feet North of Coromandel Shaft. This has been driven through very hard rock during the fortnight, 15 ft. 2 in., making its total length from cross-cut 69 ft. 8 in.. lode composed of hard quartz 6 in. wide. There is no improvement in the 420 ft. south of cross-cut, lode still very small, 16 ft. has been driven since last report, total length now being 35 ft. 3 in. In the 320 ft. north a great improvement has taken place in the size of the lode, it now being 3 feet wide, its composition being a hard good-looking quartz. Since last report 18 ft. has been driven, making its total length 315 ft. Prospect Shaft.—The shaft is now 475 ft. 4 in. deep, 10 ft. 4 in. has been sunk for the fortnight. No load in the shaft. The 440 ft. cross-cut north-east has been driven for the fortnight 28 ft. 2 in., total length 86 ft. 11 in., and still in the dyke. There is no improvement in the 500 ft. south of winze, the lode being nothing but a wall, total length of the level being 41 ft.; 16 ft. has been driven since last report.

THE *Adelaide Observer*, of March 10th, says some very rich stuff has been struck on the Mount Pleasant Mining Company's property, known as Toy's Syndicate, where work has been vigorously carried on for a considerable time. Forty-five ounces of gold were dollied out of a few bags of stuff which was taken out of the reef last Friday. Two bags of stuff taken from the same reef at a depth of 13 feet realised 63 ounces of gold. Splendid specimens were also found along the reef. From Tuesday to Friday 112 ounces was taken out 9 feet from the surface: Nearly 1 cwt. of splendid specimens rich in gold has been taken from the same claim.

ALAMILLOS.—Mine report dated April 11: In the 160 fathom level driving west of Taylor's engine shaft the lode looks kindly, and is letting out a quantity of water. The 100 west of Judd's engine shaft continues to open out good stoping ground, and is worth 2 ton per fathom. The lode in the 100 east of the same shaft, worth 1½ ton per fathom, has improved, and is laying open paying ground. Good progress is being made in sinking Isidoro's winze below the 70 fathom level. The stopes continue to turn out well. Surface works are kept on very regularly, and the machinery is in good working condition. Estimated raisings for April, 250 tons. The tributers returned 43 tons of mineral in the past month.

CRAVEN'S CALEDONIA.—The following fortnightly report has been received from the mine, dated Charters Towers, March 1: During the past fortnight No. 9 level has been extended 9 feet by three men on wages, making a total of 179 feet from the slide. The reef in this level is about 10 inches thick of very good quality. In the first two stopes the reef is about 10 inches, but in the other three stopes about 8 inches. No. 8 level has been driven a further distance of 7 feet by three contractors, which makes a total of 296 feet from the slide. The reef in the level remains about the same: in the first two stopes over the level the reef is about 1 foot thick and 8 inches in the next two, and about 10 inches in the rest of the stopes. In the stopes over No. 7 level the reef will average about 7 inches. The No. 6 level has been extended a further distance of 9 feet by three men on wages which makes a total of 328 feet from the slide. The reef in this level is about 7 inches thick of good quality. In the stope over this level the reef is about 9 inches thick. The winze in No. 4 level has been sunk a further distance of 7 feet by two men on wages, total from level 30 feet, and the ground remains about the same. The haulage of quartz for the past fortnight was 110 tons, making a total of 374 tons for present crushing. 140 tons have been carted to the mill. We are still doing a little repairing to the underlie. (Signed) G. Cabassi.

CHIAPAS.—Mine report for fortnight ending March 15: Providencia No. 2 rise west advanced 7 feet 4 inches; total 41 feet 1 inch. Assay per ton 4½ dwts. gold, 8 to 11 ounces silver, and 3·4 to 5·2 per cent. copper. Ore mixed with country rock in blasting footwall side of raise, which accounts for lower assay value; extracted, 92 tons. Providencia No. 3 west drift driven 10 feet 10 inches; total, 20 feet. Santa Fe drift driven 5 feet 10 inches; total, 38 feet 8 inches. Assay value per ton 1 ounce 2 dwts. to 1 ounce 4 dwts. gold, 5 to 8 ounces silver, and 3·1 to 5·2 per cent. copper. Carrying drift forward 7 feet wide and looking very good. In the pay streak free gold; extracted, 22 tons. Santa Fe, or No. 2 winze, and Taylor drift west No. 2 suspended for want of power; no rain. Taylor or No. 3 winze sunk 7 feet 4 inches; total, 33 feet 9 inches. A little more water in bottom, otherwise no change. Taylor No. 3 stope extracted 265 tons. Assay value per ton 9 to 12 dwts. gold, 5 to 7 ounces silver, and 3 to 4·1 per cent. copper. South east corner of stope extended in a face of good looking stone. Taylor No. 2 stope extracted 14 tons. Assay value per ton 4 to 6½ dwts. gold, 3 to 5 ounces silver, and 2·1 to 3 per cent. copper. By hand picking can be graded much higher for mill. Old Providencia extracted 202 tons. Assay value per ton 16 dwts. gold, 10 ounces silver, and 7 per cent. copper. Looking very well, and assay value probably too low. Santa Fe stope extracted 230 tons. Assay value per ton 10 to 11 dwts. gold, 4 to 6 ounces silver, and 3 per cent. copper. In appearance the last week inproved; assay report low. No rock drills running. Short of labour somewhat in mine, as we are using miners to break stone for walls of stamp mill off and on.—(Signed) Edward T. McCarthy, Superintendent.

CUMBERLAND GOLD.—I now beg to submit my report for month of December:—No. 1 winze, 9 level south: The contractors completed this winze during the month. Towards the bottom a large quantity of water came in, and at 90 feet down 5 inches of poor looking stone showed on the footwall. Judging by the formation met with towards the bottom of the winze, and the fact of 3 feet of stone going down from No. 9 level, on the hangingwall south of the winze, I should not be surprised to come on stone when we are driving No. 10 level south. The contractors have completed their contract for sinking No. 2 shaft 100 ft. The total depth is now 1106½ ft. At the present depth I regret to say that there is no appearance of any reef. For the last 60 feet to maintain the grade of our truck line we were compelled to leave the footwall and carry down the shaft on the hanging wall. A crosscut of 4 feet 6 inches was driven about 80 feet down from No. 9 level into the footwall, but no reef was visible, though 10 inches of a soft formation, with minute traces of quartz, showed right on the footwall. The bottom of the shaft is not on the footwall, but I shall strike the latter after driving No. 10 level south about 10 feet from the shaft.—Crosscuts: After crosscutting 31 feet 6 inches in the footwall No. 7 level south I abandoned further operations there owing to the hard character of the country and the absence of any favourable indications. During the month a contract was let to a party of men to crosscut in the footwall No. 4 level south about 75 feet from the shaft at 52s. per foot. They have now driven 20 feet; the country for the most part has proved softer than in the other crosscuts, but at the present time there are indications of harder ground.—No. 10 level south; So soon as I can complete the plat a party of men will be started driving southward.—No. 9 level south: Tenders have been invited for continuing this level 100 feet further to the south.—(Signed) Anthony Gallagher.

FORBES REEF.—The mine manager reports progress for the month of February, under letter dated February 12, as follows:—Avalanche: No. 2 mill, 10 head, has been removed to the Avalanche: excavations made for erecting same. Work done: Main shaft drive bottom of pit, 16 feet; Avalanche deads removed, 500 tons; ore bins (reserve), 200 tons; Avalanche mill ran 10 head, 22 days 7½ hours; crushed 1244 tons, won 60 ounces smelted gold; No. 1 mill ran 20 head, 20 days 12 hours, crushed 583 tons soil, won 38 ounces 8 dwts. 19 grains smelted gold. Tailings: Avalanche traces, No. 1 mill, 5 grains value.

FORTUNA.—Mine report dated April 11: Canada Incosa Mine: The lode in the 150 fathom level driving west of O'Shea's engine shaft contains good stones of ore. In the 110 west of San Pedro's shaft the lode is without value at present.—Los Salidos mine: The 200 east of Taylor's engine shaft continues to lay open good stoping ground, and is worth 2 tons per fathom. In the 105 east of Palgrave's shaft, worth ¾ ton per fathom, the lode has improved and turns out good lumps of ore. Cordova's winze below the 188 fathom level is going down speedily in a regular and compact lode, and is valued at 2 tons per fathom. The stopes continue to yield fair quantities of ore. Surface works are kept on very regularly and the machinery is in good working order. Estimated raisings for April, 250 tons. The tributers returned 97 tons of mineral in the past month.

GOLD FIELDS OF MYSORE.—Report on prospecting work dated March 28: West Balaghat block: No. 1 shaft: South drive at the bottom of this shaft has been driven 5 feet 4 inches, total distance 38 feet. Lode in the end 2 feet wide, assaying 14 dwts. 3 grains of gold per ton. North drive has been driven 4 feet 2 inches, total distance 24 feet 8 inches. Lode in the end 2 feet wide, assaying 2 ounces 10 dwts. 11 grains of gold per ton. No. 2 shaft has been sunk 2 feet 6 inches, total depth 117 feet. Lode in the bottom 2 feet wide, assaying 10 dwts. 9 grains of gold per ton. South drive 100 feet from surface has been driven 2 feet 9 inches, total distance 59 feet. Lode in the end 1 foot wide, assaying 9 dwts. 10 grains of gold per ton. North drive has been driven 3 ft. 4 in., total distance 50 feet 4 inches. Lode in the end 2 feet 3 inches wide, assaying 15 dwts. 6 grains of gold per ton.—No. 3 shaft: South drive at the bottom of this shaft has been driven 8 feet, total distance 30 feet 6 inches. The lode in the end is about 8 inches wide, assaying 14 dwts. 3 grains of gold per ton. North drive has been driven 8 feet, total distance 13 feet 9 inches. Lode in the end 2 feet wide, assaying 16 dwts. 8 grains of gold per ton. No. 4 shaft has been sunk 4 ft. 3 inches, total depth 106 feet 6 inches. Lode in the bottom 1 foot 3 inches wide, assaying 1 ounce 9 dwts. 14 grains of gold per ton.—Road block: Shaft No. 2 north of No. 2 eastern lode: At the bottom of this shaft 45 feet from surface we have driven a cross cut 19 feet. 12 feet from shaft we met with a stringer of quartz 10 inches wide, assaying 8 dwts. of gold per ton. This has now been suspended. We have put the coolies to sink another trial pit 200 feet north of the above on the same lode.

LINARES.—Mine report, dated April 11: Pozo Ancho Mine: In the 200 fathom level, driving west of Peill's engine shaft, worth 3 tons per fathom, we have opened up a good piece of valuable stoping ground in the past month. The lode in the 155 west of the same shaft is small, but contains some good stones of ore. In the 178 west of Warne's crosscut the lode is very wide and spotted throughout with lead ore. No. 276 winze below the 178 fathom level: We have commenced the sinking of this winze, and hope to get it down a few metres before fixing a drawing lift, worked by means of horizontal rods through the level and crosscut and attached to the main rod in the engine shaft. We hope to make good progress in getting down to the 200 fathom level. The stopes continue to yield well. Surface works are kept on very regularly and the machinery is in good working order. Estimated raisings for April, 200 tons. The tributers returned 99 tons of ore in the past month. Quinientos Mine: Taylor's Engine Shaft: In the 185 south the men are getting along speedily with their work. The lode in the 165 east continues large and open, and has improved a little in value; worth ½ ton per fathom. The lode in the 150 east has further declined in value during the past fortnight, and is now valued at 1 ton per fathom. In the 130 east the lode is small and unproductive. Estimated raisings for April, 150 tons. The tributers returned 62 tons of minerals in the past month.

MOUNT LYELL.—Messrs. W. H. Barker and Co., have received the following report, under date Mount Lyell, February 28: Engine shaft: Western crosscut at 100 feet level to 42 feet, rock still very hard, and carries pyrites and small threads of fahl ore. Engine shaft, 50 feet level, south drive extended 25 feet; stopes on ore body north of shaft continue to turn out rich ore. No. 2 shaft sunk 4 feet, total 88 feet. No. 5 tunnel driven 305 feet; face now in fair driving ground, and better progress should be made.—New road; Up to date, contractor completed clearing, grubbing, and stripping 114 chains, forming 105 chains, corduroying 41 chains, culverts 12; widening and repairing of road from junction of new road to mine is well in hand. Ore dispatched for week 184 bags, weighing 8 tons 7 cwts., and containing 14,094 ounces silver and 26 per cent. of copper raised and bagged for fortnight.

MOUNT ZEEHAN (Tas.)—Manager reports for week ended March 6: Argent Section: Main engine shaft, No. 6 lode 72 feet level north, stope in back of level continued. Ore raise 20 tons 8 cwts. fair quality seconds. The intermediate drive south has been extended 47 feet and has produced 47 tons 9 cwts. very good seconds. Lode averages about 2 feet wide. 132 feet level north ore raised 83 tons 17 cwts. medium quality seconds. Rise south in back of this level has been put up 2 feet, total 5 feet. Ore raisen 5 tons 17 cwts. fair quality seconds.—Francis Lode: The crosscut south at this level has been extended 4 feet, total 34 feet.—Prospect Shaft: Have cleared site for engine, put in trestles for pump beam, and hope to be ready in a week from now to resume sinking. Concentrator has run 47 hours and milled 157 tons 11 cwts. seconds for 31 tons 1 cwt. concentrates, containing about 23 tons 10 cwts. of lead and 2154 ounces of silver.

NAMAQUA COPPER.—Abstract of superintendent's report for February: Tweenfontein Mine, Shaft: The sinking of the shaft below the 115 fathom level is about to be resumed. 115 fathom level east, the full breadth of the lode has not been seen, but so far a large and promising section of mineral ground appears to be opening up—breadth of driving 6 to 7 feet. Worth 6 tons of ore per fathom. 105 fathom level east, this driving is still in good ground. Worth 8 tons of ore per fathom. 105 fathom level west, patches of stone occur occasionally, but a valuable piece of ore ground is being opened up. Worth 8 tons of ore per fathom. 95 fathom level west, here the lode is smaller, but of much the same character as for some time past. Worth 2 tons of ore per fathom. 85 fathom level west, the ground on this level is mineralised throughout, but the ore is of low grade. The lode is wider than the level and should improve. Worth 3 tons of ore per fathom. 85 fathom level, No. 21 winze, this winze will connect with the 95 fathom level and give good ventilation in this part of the mine.—Stopes: 105 fathom level west, in back and on south side this stope continues to yield well. Worth 10 tons of ore per fathom. 95 fathom level stope in bottom, there is no change at this point. Worth 8 tons of ore per fathom.—New Shaft: 25 fathom level east, the lode here is disordered by what appears to be a cross course. The driving will be continued. Worth 3 tons of ore per fathom. 25 fathom level west, the part of the lode carried is 9 feet 9 inches wide, and there is more copper ground on each side. Here there is a fine looking body of ore. Worth 10 tons of ore per fathom.—Phillips Shaft: Spots of ore are occasionally seen in the rock, but as yet nothing of value.—Shipping: The *Wanlock* arrived at Swansea on March 27 with about 1050 tons of ore. The *Glanrafon* left Port Nolloth for Swansea on April 7 with about 730 tons of ore. The *Lord Clyde* arrived at Port Nolloth to load on April 2. Output for March 400 tons of ore of 28 per cent.

NEW QUEEN.—The following fortnightly report has been received from the mine dated Charters Towers, March 2: No. 2 level north: The winze from this level has been sunk a further distance of 23 feet, making 48 feet from level. A little rubbly quartz has been met during the fortnight, but no appearance of anything permanent.—No. 1a level; A small piece of ground remains unworked on the boundary of the Band of Hope. I have started two men to work here, single handed, the stone is small but of good quality.—No. 4 south level: Stoping has been carried on over this level, the formation in places is very wide. The reef in these stopes has been very small during the week, a large portion being blank, and a thin vein in places on the footwall and hanging wall averaging about 3 inches. A winze has been sunk from this level to intersect the stopes over the No. 5 level, and holed when sunk 25 feet.—No. 5 south level: This level has been extended a further distance of 10 feet, making 183 feet from underlie shaft. There is no stone in the face of level. Stoping has also been carried on over this level. The reef continues very irregular varying from 3 to 9 inches of good quality. No. 5 north level has been advanced a further distance of 9 feet, making 115 feet from underlie shaft. The formation is fairly tight ground, and does not shoot well, A thin vein of stone continues on the hanging wall about 3 inches in thickness. A little stoping is also carried on over this level. The reef running from a leader up to 6 inches.—No. 4 formation: The level from the bottom of straight shaft has been connected with the stopes. This has considerably improved the ventilation in the stopes. Shoots have been fixed in the passes, which will permit the air to pass along the level without meeting the friction of passing over several heaps of stuff which would lessen the force of the current. A saving will also be effected by filling from these shoots. We have commenced in the end of level, and would suggest that this would be continued at least one shift out of three, as only one rock drill is employed. A little stoping has been done during the fortnight, the reef varying from 3 inches to a foot. Amount of quartz raised during the fortnight: No. 4 south level 225 trucks; No. 4 north and south, 139 trucks; No. 4 formation, 69 trucks; total, 433 trucks; approximate weight, 315 tons.—(Signed) W. Henderson.

NO. 7 NORTH EAST QUEEN.—The following fortnightly report has been received from the mine, dated Charters Towers, March 2 Since my last report Hall and party crushed 21 tons for 26 ounces 6 dwts. 6 grains of smelted gold from under the No. 1 western level. At present there is from 4 to 6 inches of fair looking stone in the face. Perry and party under the No. 3 eastern level are working on a leader on the hanging wall from 6 to 10 inches in thickness of good mineral stone. Goninon and party are at present crushing from stulls over No. 3 eastern level. Pearce and party gave up their block, which they are working from the Golden Gate. I have let the stulls from No. 5 level to No. 3 level to Roberts and party (four men). I have also let a small block over No. 3 western level. Total amount of stone raised during the fortnight 25 tons.—(Signed) H. Davis.

OSCAR GOLD.—The following report has been received from the mine dated Haugesund, April 14: Hodgkinson's lode: As mentioned in last week's report, the lode in the 500 north level has still a very broken appearance; the quartz is intermixed with the country rock. Within the last few days a grey quartz, identical with that which accompanied the lode from surface to the 80 feet level, has come into this level, and is holding the same relative position to the true lode here as at surface. There is no alteration in the lode in the 200. I collected the amalgam and found same weighed 147 ounces. I retorted and smelted on Thursday, with result 35 ounces bullion from 147 ounces amalgam. This low produce of the amalgam is owing to the extreme fineness of the gold. The 35 ounces gives for 200 tons quartz 3½ dwts. per ton. We should have still some of the best quartz on hand, as a large part of the stuff from the 200 has yet to be milled.

PESTARENA UNITED.—W. Henwood Trelease, T. H. Messa April 3: The 55 end east on No. 1 lode has become softer and carries less pyrites, but of better quality, now estimated to yield 7 tons per fathom, at 1 ounce 5 dwts. The 70 east has passed through the junction with the last quartz branch intersected, and is again improving and looks most promising, yielding 2 tons per fm., at 1 oz. The 70 west is still in junction with the flat lode, and no improvement is expected until this has been passed through; present yield 2 tons per fathom, at 1 ounce. The A. and B. lode in the 70 west is somewhat smaller, but is yielding 2 tons per fathom, at 1 ounce 15 dwts. A new cross cut has been started at the 70 to cut the No. 1 and A. and B. lodes further west.—Stopes: There are 12 stopes at work, averaging 4½ tons per fathom, at 1 ounce 4 dwts. per ton.—Stabioli; In the Anza level a branch of pyrites 10 centimetres wide by two metres long has been passed through, assaying 1 ounce 8 dwts. per ton. The lode is now 2 metres wide, showing patches of quartz and mixed throughout with fine pyrites. The 18 metre level north has been suspended, and a winze commenced on the ore shoot passed through in the same level south.—General Remarks: The transport of timber was completed in the stated time. A breakage occurred on the 28th ult, to two of the cog wheels of the hoisting machine, and they are replaced and the machine again at work on the evening of the 29th. The excavations for the turbine and pumping machine is nearly completed. The water is in fork to the 140 fathom level, and there is now sufficient surface water to run all the machinery at full speed.

SUTHERLAND REEF.—Mine manager's letter dated March 22: I can assure you that the mine is sufficiently developed to warrant erection of above-named 20 stamps battery. By the time the battery is erected you can rely on it that there will be quite sufficient ground opened up to keep it continuously at work. I consider that all the ground from the 300 feet level to within about 35 feet from the surface is payable. The main incline shaft has been cut down 10 feet during the last week, which will make a total of 125 feet from the surface. In cutting down the shaft I find the reef is from 3 feet to 2½ feet in width at this point.

QUEEN'S BIRTHDAY UNITED.—The directors have received the following mail advice from Mr. W. T. Hansford, the Company's local secretary at Dunolly, dated 12th March, 1894. Queen's Birthday Mine Main Shaft.—We have ordered a new wire rope 1200 feet long for the main shaft, and intend forthwith to take the water out to the bottom of shaft, we shall then have the No. 7 level surveyed and a cross-cut put in east to strike the main wall, when we trust we shall strike payable stone, if so, our future is assured. At No. 5 level the drive is being extended north on a nice looking stone full of minerals, but just at present not much gold to be seen. Above this level there is a quantity of stone which can be put through the battery, and although not rich, we believe it will pay expenses. Another crushing will be put through shortly. Centre shaft.—The work here of putting in centres and skids is nearly completed, the new safety cage has been delivered, and everything is in readiness to get up steam, in the course of a week or two we shall have men below doing exploratory work, and as soon as the levels have been extended, we fully expect to send you some favourable news from this part of the mine. Some of the oldest hands are very much impressed with our chances at this point, and I hope their reports will be fully confirmed as we open up the ground. Belgium Perseverance Mine.—The cross-cut has been delayed for a few shifts, but this is now being pushed ahead with all vigour, we expect to strike the reef in about a fortnight from now, but we fear as we get near the reef we shall be driven out with the water, for at present the incoming water is fully 500 gallons per hour, but you may rely that we shall do our best to master it.

PETROLEUM.—In a report to the Bureau of American Republics on coal and petroleum in Columbia, C. F. Z. Caracristi, C.E, states that not less than 40 newly-discovered petroleum springs—one capable of supplying a 6 inch pipe—ooze forth in localities from 1 to 3 miles from the shores of the gulf of Uraba. The oil, as filtered by the soil, is remarkably pure. A discovery that is most interesting, on account of the light it throws on the origin of petroleum, was made at a point about 10 miles from the Rio Iquana, in the mountain range of Gigantones, where was found what at first appeared to be a geyser, but which proved to be an oil spring. The oil and water rising out of the crater at intervals brought up small lumps of burnt carbonate of lime and charred specimens of sulphur and of ozokerite, or mineral wax. The oil and water at the surface had a temperature of 130 degrees. Mr. Caracristi's conclusion is that the petroleum "was, doubtless, produced by the combination of carbonic acid gases with sulphuric acid gases working on the ozokerite and metallic bases of the surrounding earth, and then combining with hydrogen. In this condition it came to the surface with the heated water of the spring, or perhaps the hot fumes were plunged into the water and became condensed, heating the water. The oil then formed on the surface of the water, being lighter, and was then held in suspension until sufficient steam was accumulated in the water to eject it, which explains the reason why the oil rose to the surface alternately with and before the water."

THE MINERALS OF TASMANIA.—The quantity of minerals raised in Tasmania in 1867 was 1363 ounces 5 dwts. of gold, valued at £4381 16s. Up to the year 1875 gold was the only mineral raised in any quantity, but in that year, in addition to £11,982 worth of gold, 490 tons of tin, 3200 tons of iron ore, and 7719 tons of coal were mined. The production of these minerals, with the exception of iron ore, went on steadily increasing. In 1879 the zenith of the gold production was reached, 60,155 ounces, valued at £230,895, being then extracted. Since that period the amount produced has fluctuated considerably, the lowest point being reached in 1890, when the production was only 23,451 ounces. Last year this was exceeded by about 14,000 ounces. In 1888 silver made its first appearance in the returns, the value of the 417 tons then raised being set down at £5830. One hundred tons of copper were also exported at that period. The production of silver-lead ore increased gradually till 1892, but in 1893 it took an enormous bound, the number of tons shipped from the Colony being 15,710, with a gross value of £188,520. The maximum value of the Tasmanian mineral production was reached in 1887, when the total attained was no less than £761,683 from tin and gold alone, the value of the former exceeding £500,000. Last year, although the quantity of tin produced was but 792 tons less than that of 1887, the value of the metal, in consequence of depreciation, came to but £245,500; and the total value of the mineral production of 1893 was £599,971, made up as follows.—Gold, £145,094; tin, £245,500; coal, £20,857; silver, £188,520. There is a slight diminution in the production of gold, tin, and coal in 1893 when compared with 1892, but the silver production has largely increased. The development of the mines and the introduction of more complete appliances, together with the discovery of new fields, all tend to give the best reasons for anticipating that the mineral returns for 1894 will far exceed those of last year.

CONCILIATION IN THE NORTHUMBERLAND COAL TRADE.—A meeting of representatives of the coalowners and the miners in Northumberland was held at the Coal Trade Office, Newcastle-on-Tyne, on Saturday, to further discuss the question—which has been under consideration for some time—of the desirability of establishing a conciliation board for the regulation of the wages in the county.—Mr. R. O. Lamb, Chairman of the Employers' Association, presided, and the miners' representatives included Mr. Charles Fenwick, M.P. After talking the matter over, the owners agreed to the establishment of a wages board, and a committee composed of employers and employed was appointed to settle details.

PROVINCIAL SHARE MARKETS.

THE CORNISH MINE SHARE MARKET.

MR. SAMUEL JOHN DAVEY, Dealer in Cornish Mine Shares, Redruth, Cornwall, reports under date of April 12 (4 o'clock), as follows:—We have had a very slow market this week, and prices have not altered very much. Market is inactive to-day. Following are quotations:—Blue Hills, 1s. to, 3s.; Carn Brea, 11 to 11¼; Cook's Kitchen, ¾ to 1; Dolcoath, 78 to 79; East Pool, 11 to 11¼; Killifreth, 3½ to 3⅝; South Condurrow, ⅜ to ½; South Crofty, 3¼ to 3⅜; South Wheal Frances, 1¼ to 1½; Tincroft, 12⅜ to 12½; West Frances, 2 to 2½; West Kitty, 7 to 7¼; Wheal Agar, 2 to 2½; Wheal Basset, 3 to 3¼; Wheal Grenville, 15½ to 15⅝; Polberro, 1 to 1¼.

Mr. MICHAEL WILLIAMS BAWDEN, Mining and Assaying Offices, Liskeard, Cornwall, writes (April 19) as follows:—The mining market is dull and inactive on the receding tin standard, and unsatisfactory results of the mine meeting held this week. Most shares are offered at lower rates, but fail to induce buyers. The following are closing prices:—Blue Hills, ¼ to ⅜; Carn Brea, 10⅞ to 11; Cook's Kitchen, 1¼ to 1½; Dolcoath, 77 to 77½ x.d.; Devon Consols, 17s. 6d. to 18s. 6d.; East Pool, 10⅞ to 11; Killifreth, 3 to 3⅛; Levant, 5 to 5½; Phœnix United Mines, ½ to ⅝; Polberro, ¾ to 1; South Crofty, 2½ to 2⅝; South Frances, 1¼ to 1⅜; Tincroft, 12¼ to 12½ x.d.; West Frances, 2⅜ to 2½; West Kitty, 6¾ to 7; Wheal Agar, 2 to 2¼ c.p.; Wheal Basset, 3 to 3¼; Wheal Grenville, 15 to 15½; Wheal Kitty, ⅛ to ¼.

Messrs. ABBOTT AND WICKETT, Stock and Share Brokers, and Mining Share Dealers, Redruth, write under date of Thursday, April 19:—The Cornish share market has held its own fairly well during the past week, with a moderate demand for Dolcoaths, Tincrofts, and South Croftys. Killifreths lower, but close steady. Polberros rather more enquired for. Closing quotations herewith (four o'clock):—Carn Brea, 10¾ to 11¼; Cook's Kitchen, ¾ to 1⅛; Dolcoath, 78 to 79; East Pool, 10¾ to 11¼; Killifreth, 3⅛ to 3⅜; Phœnix, ¼ to ⅜; Polberro, 1 to 1¼; South Condurrow, ⅜ to ½; South Crofty, 3 to 3¼; South Frances, 1⅜ to 1⅝; Tincroft, 12⅜ to 12½; West Frances, 2 to 2¼; West Kitty, 6¾ to 7¼; Wheal Agar, 2 to 2¼; Wheal Basset, 2⅞ to 3¼; Wheal Grenville, 15¼ to 15¾; Wheal Kitty, ⅛ to ¼. Tin, 69⅝.

MANCHESTER.

Messrs. JOSEPH R. and W. P. BAINES, Stock and Share Brokers, Queen's Chambers, 7, Market-street, write, April 19, 1894 (noon):—There have been some distinct movements in the several markets during the past week. Amongst rails these movements are irregular, home rails being (with exceptions few and slight) gene rally higher in value. Whilst almost without exception Canadians and Americans are lower, as also are Mexicans. In other markets values are better for the most part, though mines and coal and iron, &c., concerns show change, mostly of an adverse nature. In home rails the foremost changes are Great Western 1½, Brighton A 1¼, and London and North Western 1, besides several others fractionally higher. The declines herein are very few, and do not amount to more than ¼ to ½. Americans, with just a little rally now and then, have declined throughout the week, and on comparison with last Thursday's figures the following changes are to be noted—viz., Norfolk and Western Pref. $2¾, Milwaukees $2, Denver Pref. $1, Atchison Income bonds $⅜ to $½, Readings $⅜, Union Pacific $½, Louisvilles $⅜ to $½ down, and a lot of others lower in small fractions. exception to the general rule of lower prices is found in Atchison ordinary, which quote $½ better. In Canadians a few of the Trunk issues are ¼ to ⅜ lower, and Pacifics are $⅜ down. Mexicans quote second preference, 2 first preference 1½ and ordinary ⅜ lower. Consols mark an improvement of 3-16 on the week. Colonial Government Bonds are only altered in Cape of Good Hope, the Inscribed and Consolidated issues of which are each ¼ up. Home Corporation Stocks have produced a few dealings in Manchester issues, and Douglas Three and a Half per Cent., otherwise quiet. Higher Manchester Three and a Half per Cent., ¼ to 1½; Bradford Three and a Half per Cent., 1; Blackburn Three and a Half per Cent., ½; Hull Three and a Half per Cent., ½; and Newcastle Three and a Half per Cent., ½.; Lower Manchester Four per Cent., ½. Foreigners save for improvement of 3 each on Brazilian Four and a Half per Cent. and Four per Cent. only show fractional changes on either side, and these about evenly divided between higher and lower. Business in miscellaneous shares is of a very straggling character except for repeated dealings in Ship Canal issues, Salt Unions, United Alkalis, and one or two banking company shares.

BANKS.—Salfords have been done repeatedly, otherwise transactions are desultory.—Higher: Parr's, &c., ⅜; Imperial Ottoman, ½; County, ½; Bank of Liverpool, ½; Lancashire and Yorkshire, ⅛; District, ½.—Lower; Consolidated, 1-16; and Mercantile of Lancashire, 1-16.

INSURANCE.—Hardly anything doing. Variations in quotations are few and small, ranging from 3d. to ½ per share, and they are just as many one side as the other, the extent of change being divided also equally.

COAL IRON, &c.—Cammells are a further ½ better, but others where altered are easier as follows—viz., Bolckows fully paid ordinary, ½; A. Knowles and Sons, ½; Parkgates, 1 to 2; Sheepbridge A, ½; Staveley A, ½; and ditto C, 1 to 2.

MINES.—Masons are up ½, but they are solitary on the upward sides; Lower Consolidated Gold Fields, 3-16; Tintos, ½; De Beers, ½; and Burma Ruby, 1-16.

COTTON SPINNING, &c.—Nothing new to report in this market. Figures still quite nominal, but where prices are tested ease is mostly to be noticed,

TELEGRAPHS AND TELEPHONES.—All better where altered at all, but this is of little moment save for Anglo-American Telegraph issues, the pref. being 1½, ordinary ½, and deferred ¼ higher.

MISCELLANEOUS—So far as business here is concerned Ship Canals are well to the front, and some wide fluctuations have occurred therein. The publication on Monday last of a report of the finance committee of the directors, which entirely contradicts the sinister rumours recently "going the rounds" of necessity for further capital, put prices up sharply, but from these advances figures have since elapsed from lack of support and have settled back to just the turn over 3 and 4 respectively for ordinary and preference, at which figures they have remained about steady during the past day or two. This represents on the week a fall of 1-16 on ordinary and ⅛ on preference, but, of course, is well below the prices of the week. Salt Unions have been pretty brisk at or near full recent values, and United Alkali have changed hands repeatedly at declining prices, with latest markings at or about the lowest of the week. Allsopp's have been "kicked about" up and down several times, the balance as against last Thursday being rise of 1. Guinness are 5 up. Chesters Brewery are a further ¼ to ½ lower. United Alkalis are ⅜, and Northern assets 2s. down. Imperial Continental Gas are 3 higher, but Gas Light and Coke without quotable alteration here are marked with business done at lower figures than recently. Brunner Mond £8½ paid are ⅜, and ditto fully paid ½ easier.

LATER (4.0 P.M.)—A dull day all round. As regards values Home Rails are about steady, but Americans and Canadians are flat, particularly the Grand Trunk issues amongst latter. This flatness in Trunks is brought about by a rumoured fresh issue of debenture stock soon to be brought out. Ship Canals close steady at about last prices.

SCOTCH MINING AND INDUSTRIAL COMPANIES SHARE MARKETS.

STIRLING.—Mr. J. GRANT MACLEAN, Stockbroker and Ironbroker (April 19), writes:—During the past week there has been less business doing. Although trade is not very active, it is satisfactory that there is considerable improvement so far as compared with 1893. The money market remains easy, and the Budget proposals have had no effect on markets.

In shares of coal, iron, and steel companies the principal business has been in Steel Company of Scotland shares, which declined from 68s. to 56s. on rumours of a call or an issue of preference capital, but these having been denied, the price has recovered to 62s. Bolckow Vaughan are at 11½; Ebbw Vale, 9½; Marbella, 60s.; Niddrie Coal, 52s.; Rhymney Iron, 30s.; Stewart and Clydesdale, 8½; and Wilsons and Clyde Coal, 9⅛.

In shares of foreign copper concerns there has been more business doing. Tinto have declined from 15 13-16 to 15⅛, the dividend of 7s. per share, the same as last year, being a little disappointing. Tharsis are about 99s., Arizonas 7s. 3d., Cape 29s. 6d., Copiapo 30s., Mason and Barry 56s. 3d., and Rio Tinto Second Mortgage 102.

In shares of gold and silver mines a fair amount of business has been done, but prices are generally easier on realisations. Montana remain at 6s. 6d. African Gold Recovery and Land shares are both rather better on account of the large proportion of the Rand output secured by the African Recovery Company's process in March, owing to the company having gained the action in the German courts contesting the validity of its patents. Chartered touched 38s. on announcement of further alluvial discoveries. The Frontino Company announce a profit of £1727 for February. The Aladdin's Lamp Company will pay an interim dividend of 1s. Gold Fields of Mysore propose to issue 55,000 new shares at par, which existing shareholders will get in the proportion of one new for four old. The Mysore Wynaad Company is to be reconstructed in £1 shares, with 17s. 6d. paid. African Consolidated are at 2s. 9d.; American Belle, 2s.; Broken Hill Proprietary, 50s.; Bechuanaland, 32s. 6d.; Blue Spur, 1s.; Champion Reef, 76s. 6d.; Consolidated Gold Fields of South Africa, 48s. 3d.; Caratal, 10½d.; Champ d'Or, 18s. 9d.; Day Dawn P.C., 4s. 9d.; Don Pedro, 3s. 6d.; La Colombia, 31s.; May Consolidated, 10s. 6d.; New Virginia (Transvaal), 4s.; Nundydroog, 25s.; Nouveau Monde, 3d.; Orita, 2s. 3d.; Pardy's Mozambique, 15s.; Springdale, 2s. 9d.; South African Gold Trust 20s.; Sheba, 25s. 6d.; St. John del Rey, 22s.; Totumo, 5s. to 7s. 6d.; and Willoughby's Mashonaland, 29s.

In shares of miscellaneous companies prices are steady. In oil companies Broxburn are at 8⅞, Linlithgow 19s. 6d., and Young's 27s., Lawes' Chemical 6⅝, Nobel's Explosives 14½, Roburite Explosives 31s. 3d., and White Lead, 5s. 6d.

GYMPIE MINING MANAGERS' ASSOCIATION.—Mr. Burbidge, of the Phœnix Assay Works, delivered the fourth of his series of lectures last month. The subject of the discourse was "Gold," and at the outset he explained that the metal was invariably found native, but although found thus, it was rarely in a state of purity, silver being alloyed to a greater or lesser extent with it, and it was a noteworthy fact that with few exceptions the gold found in Australia got poorer in quality the further north in the continent it was obtained. The gold of the Ballarat district was worth over £4 per ounce, while in some parts of Queensland the price did not exceed £1. At Maldon, in Victoria, an alloy of gold and bismuth is found, called maldonite, and in America and elsewhere compounds of gold and tellurium were obtained, such as sylvanite, calaverite, nagyagite, etc. He invited the members of the Association to submit to his inspection any minerals they might find associated with the gold in the mines under their charge, as he felt sure some of these compounds of gold existed in the district. Mr. Burbidge next explained some of the processes in use for separating gold from silver. First, the operation of inquartation, or quartation, where an alloy containing about 25 per cent. of gold was treated with strong sulphuric acid, which on the application of heat dissolved the silver, leaving the gold comparatively pure. Next, the process brought out by Miller, of the Sydney Mint, and now adopted in the colonial and home mints, in which process the alloy of gold and silver is melted in a clay crucible, the pores of which are closed with borax; some of this reagent is also added to the crucible, so that when the gold is melted a layer floats on the surface. The clay crucible, enclosed in one of plumbago for safety, is covered with a perforated cover, and when the gold assumes the molten condition a clay tube connected by stout rubber tubing to a chlorine generation is inserted through one of the perforations in the crucible cover and under the surface of the gold. Chlorine under pressure is now turned on, and any of the base metals present are converted into chlorides, which volatilise; the silver is also converted into a chloride, and rises to the surface of the gold, where it is protected by the layer of fused borax. When the operation is completed the clay tube is removed, and the supply of chlorine stopped. The crucible is removed from the furnace, and the gold allowed to solidify; the still molten silver chloride is poured off into a mould, and the silver subsequently recovered from it by an electrolytic process; the crucible containing the gold is inverted, when the mass of metal falls out, and any adhering silver chloride removed by immersion in a solution of sodium thiosulphate. In conclusion, Mr. Burbidge spoke of the alloys of gold and the action of the presence of bismuth and lead, both of which, even in small quantity, making the gold brittle—a proportion of one of the former to 1900 of gold making the latter quite brittle.

GOLD IN THE NORTH OF SCOTLAND.—The committee of the Sutherland County Council appointed to negotiate with regard to the opening of the Kildonan gold fields met at Golspie last week to consider a letter they had received from the Duke of Sutherland on the matter. The letter was to the effect that the former working of the gold fields did not encourage the duke to reopen them, and that the ground was at present under lease. Several councillors spoke on the subject, saying that the duke had been misinformed on the subject. One councillor moved that petitions be got up from all parts of the county, and a deputation then sent to the duke. He further indicated that if it was declined the people should go there without permission; and, although he was an old man, he would be the first himself to put his foot through an interdict. The convener expressed disapproval of threats, and suggested that a letter should be written to the duke expressing the hope that he would yet reconsider the matter, and help them to have the gold fields opened, which would be for the benefit of the county and also, they believed, for the benefit of his Grace. The clerk was instructed to ask the duke if he would receive a deputation.—*Glasgow Herald*.

A VALUABLE MINERAL COLLECTION.—The Council of the Adelaide School of Mines, says the *South Australian Register*, has recently acquired as a loan an exhibit of minerals gathered by Mr. H. Walloschek, whose connection with Broken Hill began in its infancy, and who has made excellent use of his opportunities to obtain rare and valuable ores. The collection contains altogether more than 1000 specimens, comprising minerals from all parts of Australia, together with a few gems from foreign countries. Naturally, the lead ores of Broken Hill preponderate in size and beauty, and experts who have seen them are pronounced in their praise of the magnificent display of crystals in all those varying forms which so delight both the ordinary visitor and the mineralogical student. A special feature is the wealth of silver ores, included in this branch being boulangerite, bournonite, brongniartite, sternbergite, and dyscrasite. One mass of native silver is especially worthy of inspection. There are 40 specimens of the zinc ores associated with the lead and silver at Broken Hill. Gold nuggets and auriferous vein stuff from the various colonies and opals from Queensland occupy a corner of the second case, in which are also small ingots of zinc, lead, silver, copper, tin, nickel, aluminium, antimony, bismuth, and iron. A number of cupelled buttons of silver show beautifully the phenomena of arborescence or "spitting" as assayer less poetically and with some disgust term this development, on account of the vitiated results of assay, and the loss sometimes caused by it. Mr. Walloschek purposes to exhibit the collection in his native land unless he should previously be induced to part with it to some public institution. In the meantime it forms a valuable supplement to the exhibits at the disposal of the Council of the School of Mines, and will be greatly appreciated by teachers, students, and visitors.

PYRITIC SMELTING.

By Mr. W. J. AUSTIN, of Denver.

NOTES ON A METHOD OF SMELTING SULPHIDE ORES.

THE following notes on a method of smelting sulphide ores, which is receiving much attention at present in the United States, have been obtained from Mr. W. J. Austin, of Denver, Colorado, a well-known mining engineer and metallurgist, and who has been identified with the first successful introduction of the process of

The Economic Advantages of Smelting Pyrites by Utilising their Fuel Qualities.

That pyrites can be ignited, and, after ignition, will continue to burn, has long been known; and this property is taken advantage of by acid manufacturers, who burn them in kilns, subsequently converting the fumes into sulphuric acid. But it has remained for modern science to show that these same pyrites can also be made to replace to a large extent the coke ordinarily used in smelting ores of copper, nickel, gold, &c. This method of smelting sulphide ores, which consists in making available the heat stored up in their iron and sulphur contents, is what is technically known as pyritic smelting, and has been so thoroughly discussed in recent scientific publications (notably in the *Bergund Huettenmaenische Zeitung*, Vol. LIII, page 42, in *Chem. Zeitung*, 1893, No. 99, and in the *Engineering Magazine*, in April, 1894), as not to warrant taking up further valuable space in this Journal. Any one wishing to inquire further into the scientific and technical points involved in this method of ore reduction can address Mr. W. L. Austin, Denver, Colorado U.S.A.; but the special object of this present article is merely to emphasise some of the pronounced advantages of pyritic smelting, when applied to suitable ores, as compared with other processes of ore reduction. The first point which merits attention is the great saving of both time and money effected by

Avoiding the Roasting of Ores.

It is well known that in the ordinary methods of treating pyritic ores, such, for instance, as the great pyrites deposits of Spain and Portugal, or those of Norway and South America, the first step in all such operations is the roasting of the ores. Great heaps of the mineral are piled up and set on fire, and allowed to burn slowly until the pyrites are converted into oxides, which are subsequently smelted, or treated in some other way, for the extraction of their valuable contents. This burning, or roasting, as it is called, requires weeks, and sometimes months, for its completion, during which time large amounts of capital are tied up in these heaps, and, therefore, unproductive. In the case of large and important mines, the year's interest account on the money lying idle in roast heaps becomes a factor of no small importance. Therefore pyritic smelting, which method takes the raw sulphides from the pits mouth, and with no preparatory treatment whatever dumps them into a blast furnace in pieces of any size that a man can lift, and within 12 hours turns out a concentrated product ready for the market, offers advantages so manifest as hardly to require comment. All the cost of labour employed in breaking, piling, and burning the raw ore is saved, and in one operation (or where high concentration is desired, in two operations) the low grade ore is converted into a product (matte) which is only reached in the older methods by breaking, roasting, and repeated smeltings. A second very material advantage gained by pyritic smelting is the

Increased Capacity of Furnaces.

For by utilising the fuel quantities of the ores themselves very much more material can be run through a furnace of a given size than where tons of coke and charcoal must be consumed, together with the ore. It requires time to consume carbon fuels, and where these can be omitted from a furnace charge it stands to reason that more of the paying material (ore) can be added to the charge. Actual practice has clearly demonstrated that when a blast furnace is operated with pyrites instead of coke, from 50 to 100 per cent. more ore can be passed through it than by the old methods of smelting. This would naturally be expected, because the sulphides of iron, &c., are extremely fusible, and softening before the high temperature produced by the combustion of the iron and sulphur they melt down rapidly and burn before the powerful air blast used, creating an intense heat, which in turn melts the batch of ore next above. Furnaces with a tuyere area of 30 square feet (a size now commonly used for smelting purposes in Western America) will smelt from 150 to 200 tons of raw sulphides in 24 hours. The labour necessary around a blast furnace is comparatively small, so that handling such large quantities of ore in so short a time and at so small expense necessarily reduces the cost per ton of ore smelted to the minimum, and permits the handling of very low grade ores. Under favourable conditions the cost of producing concentrated matte from raw sulphides, taking the latter from the pits mouth, and handling 200 tons per diem, will not exceed 6s. per ton of ore. It is generally admitted by metallurgists that the most complete extraction of metals from their ores is accomplished where it is possible to employ fusion, and, therefore, the smelting process is always adopted where admissable. But very often the cost of fuel, coke, &c., is so great as to preclude the use of this method of reduction, and, therefore, a method of smelting in which

No Coke or Charcoal is used

is a desideratum. That pyrites in itself contains sufficient calorific power to support unaided a smelting fusion has been so clearly proven as not to admit of argument at the present time, and it would be manifestly a disadvantage to employ two separate and distinct classes of fuel at the same time and in the same operation; for there would necessarily be some difference in the combustibility of the two materials, and one would burn before the other, which would lead to disturbances in the working of the apparatus. Where sulphides and coke are both burned in a blast furnace the latter burns first, and the heat thereby produced only serves to melt down the former which runs through the furnace in the form of monosulphide, and comes out otherwise unaltered. This is a self-evident proposition when one stops to consider the chemical reactions which take place, for the coke being a simple element unites readily with the oxygen of the blast, where the pyrites, which are compounds of sulphur and iron, must first have their elements dissociated before they can combine with the oxygen. This is the explanation why sulphide of iron (matte), when melted in a furnace with carbonaceous fuel, comes out in the same form as that in which it was put in, practically of the same quality and in the same amount as charged, and it also explains why it is wasteful and unnecessary to use coke in pyritic smelting, when there is sufficient sulphide of iron in the furnace charge to give the requisite heat for the operation. With a proper arrangement of the ores, fluxes, &c., concentrated matte can be produced without the aid of carbonaceous material in the charge, and, therefore, the saving in cost of treating ores over other methods is apparent, the fuel item alone being often an impassable barrier to the working of some low grade mineral deposits.

One of the first things to be considered in all metallurgical operations is obtaining a

High percentage of Extraction,

and this can be safely counted upon for by pyritic smelting, when comparing the various processes available in a given case. In this process we have to deal, firstly and mainly, with the sulphides or arsenides of iron in one form or another; and, secondly, with the metals copper, nickel, gold, silver, &c. Now, we know from experience in Bessemerising mattes, &c., that as long as the sulphide of iron is present it alone is slagged off, being far more easily oxidisable than the latter metals. The same principle holds good in pyritic smelting. The sulphur burns off, or combines with the copper, nickel, &c., while the iron is oxidised to the protoxide, in which form it combines with the silica present to form a slag. As long as sulphur is present the copper, nickel, &c., on account of their strong chemical affinities to this element, necessarily unite with it to form sulphides; and, therefore, unless the concentration is carried too far, the slag will be found to be practically free from these metals. Sometimes it is desirable to divide the operation into two parts, concentrating up to a certain point in the first smelting, and then carrying the treatment to a finish in the second. If the useful or precious metals go into the slag in any quantity in the second operation, this slag can be returned to the first smelting, where it is of service in assisting in the even operation of the furnace. Experience has demonstrated that the saving of the useful and precious metals in pyritic smelting closely approximates, if it does not equal, that obtained in the older methods of smelting.

One of the most disagreeable features connected with the treatment of large quantities of sulphide ores by the methods so long in use is the enormous quantities of noxious gases turned into the atmosphere, devastating large tracts of country and causing damage to vested interests. Any method of handling sulphide ores by which the

Sulphurous Fumes can be Utilised,

or at least rendered harmless, would in itself be a vast improvement. In pyritic smelting almost all of the air is utilised in oxidising the sulphur and iron, so that the gases escaping from the tunnel head are in a concentrated form, and can be made available for manufacturing sulphuric acid, or readily condensed in suitable towers, and thereby prevented from escaping into the air. That these gases are very concentrated is evident from the fact that often they are tinged with the yellow colour of the sulphur itself, or burn on the top of the charge, and they are, therefore, in a suitable condition for acid manufacture.

Messrs. Fraser and Chalmers (Limited), the well-known makers of mining machinery, have taken up Mr. Austin's improvements in pyritic smelting, and have in preparation a special pamphlet on the subject. Of late this firm has done a large business in special converter plants for the Bessemerising of copper matte; for the tendency of all the large sulphide copper works in the United States has been to the following methods; (1) smelting to matte; (2) Bessemerising by the Hollway process to black copper; (3) electrolytic refining with separation of silver and gold contents. Some enormous plants have been built in Montana on these lines during the last few years.

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COMPANIES AND LEGAL ANNOUNCEMENTS.

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THE SCOTTISH AUSTRALIAN MINING COMPANY, LIMITED.

NOTICE IS HEREBY GIVEN that the HALF-YEARLY GENERAL MEETING of the SHAREHOLDERS of the Scottish Australian Mining Company, Limited, will be held at Winchester House, Old Broad Street, London, on FRIDAY, the 27th of April, 1894, at Twelve o'clock at Noon precisely, to receive the Director' Report and Accounts, declare a Dividend, and transact the other usual Business of the Company.

The Share Transfer Books will be closed from Thursday, the 19th, until Friday, the 27th instant, both days inclusive.

By order of the Directors,
F. W. TURNER, Secretary.

Winchester House,
Old Broad Street, London.
17th April, 1894.

COLOMBIA GOLD MINING COMPANY.

A DIVIDEND of 16 francs (or 12s. 9d. in sterling) has been declared against Coupon No. 3, which should be presented between the hours of 10 and 2 (Saturdays 10 and 1), at the office of Baring Brothers & Co., Limited, 8, Bishopsgate Street Within, where the usual list may be obtained.

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†Tartar	—	—	—	May 12
§Spartan	—	May 6	May 12	May 19

† Calling at Madeira. ‖ Via Lisbon and Teneriffe. § To East Africa.

The twin screw s.s. *Scot* will sail from Southampton on 25th May.

All Steamers now leave Southampton on Saturday.

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TWELVE SHARES in this Company are OFFERED for SALE BY TENDER.

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April 18, 1894.

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Phosforic acid	0·076 „
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SALES BY AUCTION.

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SALE OF TWO LARGE AND IMPORTANT MINERAL ESTATES,

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TO BE SOLD, BY AUCTION, by WARNER, SHEPPARD, and WADE, at the Midland Hotel, Derby, on WEDNESDAY, May 2nd, 1894, at Three o'clock in the afternoon prompt, subject to such Conditions of Sale as will be then produced, and in the following or such other Lot or Lots as may be determined upon at the time of Sale.

LOT 1.

An Exceedingly Valuable MINERAL ESTATE at Ibstock, a rapidly rising and improving Town, in the well-known Leicestershire Coalfield, containing in the aggregate 244 acres 1 rood 13 perches of VIRGIN MINES, situate in the immediate vicinity of thriving Collieries, and near two Railway Stations, comprising—

The MINES of COAL, IRONSTONE, FIRECLAY, and other MINES and MINERALS lying under Lands at Ibstock (except the surface clay of certain portions thereof, containing together 25 acres 2 roods 24 perches or thereabouts). Together with full liberty to work the said Mines and Minerals by means only of outstroke or underground workings through any adjoining Mines or Lands acquired or authorised to be used for that purpose, and with full liberty, also by means of the Pit or Pits and underground workings by which the said Mines shall be worked, to work any other Mines, by entering only upon the surface of any Land acquired for the purpose, making compensation (to be settled by arbitration) for any damage to the surface or any buildings which stood thereon on the 26th May, 1874, but not making any compensation for any Buildings erected since that date, except Buildings (if any) now or hereafter to be erected on the site of Buildings which stood thereon on that date, nor for any damage to the surface of, or to any Buildings whatsoever (whenever erected) upon the several pieces of Land.

The Purchaser of Lot 1 will have the option of purchasing Lot 2 at a price to be named by the Auctioneers before the Sale.

LOT 2.

The Surface of all those four several pieces of FREEHOLD LAND situate at Ibstock, containing together 32 acres 3 roods 2 perches, and respectively called Allotment Close, Donnington Pasture, and Great and Little Pasture Close.

This lot obviously provides an excellent site for a Plant for working the Mines described in Lot 1.

The Estate lies to the West of the Ibstock Colliery Company's old-established Colliery, and to the south-east of the Heather Colliery Company's Plant. Workings have extended close to the Boundary of this Property, and are stated to have left off with a face of work of excellent Coal.

There are also very valuable Beds of Surface and Fire Clays, except as to the said portions of Lot 1, in which the surface clay is reserved.

The Coalville and Hugglescote Branch of the Midland and L. and N. W. Railway Companies, which is connected with the main lines of those companies, runs within a few yards of the boundary of the estate.

LOT 3.

The FREEHOLD MINERAL ESTATE, comprising the well-known Farm, with commodius farm-houses, stabling, out-offices, extensive farm buildings, productive garden, homestead and premises, situate in the village of Oakthorpe, now in the occupation of Messrs. T. and H. Christian,

Also TWO COTTAGES, with gardens and premises thereunto adjoining, containing 1 rood 4 perches or thereabouts,

The whole containing 124 ACRES or thereabouts.

Together with ALL THE MINES, beds and seams of coal, ironstone, fire clay, pot clay, and other mines and minerals, in and under the same premises, and under the Canal, Railway, and Public Highways intersecting and adjoining the same (which latter contain 6 acres 1 rood 23 poles of Mines or thereabouts), so far only as the vendors are entitled thereto.

And also ALL THE MINES OF COAL, and other Minerals in and under an adjoining field, containing 5 acres 3 roods 7 poles, or thereabouts, in the Parish of Donisthorpe, with power to work same mines, making compensation for surface damage.

There being EXTENSIVE FRONTAGES to the village street and to the neighbouring main roads, and the estate being in the vicinity of important working collieries, large portions of the above-mentioned lands are eligibly situated for Building purposes and now probably RIPE FOR BUILDING.

The Ashby Canal winds through the estate, affording practically unlimited frontages for wharves; and the Ashby and Nuneaton Joint Railway also passes through the estate, affording direct connection with the Railway upon the estate itself.

The Mines of Coal consist of seams believed to contain a total thickness of 44 feet 10 inches.

It is also believed that the Stanhope Coal and the Kilburn seam exist below the above-mentioned seams.

The Main Coal at the Oakthorpe Pits (the nearest colliery to the estate) is only 125 yards from the surface.

LOT 4.

TWO COTTAGES, with large gardens adjoining thereto, containing 3 roods 28 perches, or thereabouts.

The mines and minerals under this Lot are reserved, together with full power to work the same from other lands without compensation.

LOT 5.

The SURFACE of all that PIECE of LAND, situate at Oakthorpe aforesaid, containing 2 acres 1 rood 38 perches, or thereabouts, with extensive frontages to the main road from Burton to Measham. (The mines under this land with power to work same from other lands without making compensation, are reserved.)

Together with all the Vendors' Interest in the mines under the adjoining land, containing 1 acre 21 perches or thereabouts.

The mines under Lots 4 and 5 will, in the first instance, be added to and offered in one Lot with Lot 3.

Plans and particulars, authority to view, mineral sections, and all other necessary information may be obtained of the

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Mr. JOHN STANIER JONES,
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SIDE LIGHTS ON THE LAW:

Legal Jottings on Cases in the Courts, and on Questions affecting Mining, Railway, Financial, Industrial, and allied Interests.

BY A BARRISTER.

ONE of the most difficult things that a would-be leader of his fellows has to learn is that "there is a time to speak and a time to keep silence." There can be little doubt, I hope, that the truth of this Mr. Bailey, the Nottingham delegate of miners on the Conciliation Board, under the presidency of Lord Shand, is even thus early beginning to realise. It would, indeed, be a grievous pity if Mr. Bailey were to obtain any following of importance at the present moment. It would not show that Mr. Bailey was right; but, on the contrary, when "calm reflection comes," it would prove and be accepted by all mining men, whether belonging to the class of employers or to that of the employed, that the course taken by Mr. Bailey is wrong. A moment's examination of the position will show this. The board is appointed as, and intended to be by common consent of both parties, a Board of Conciliation, and as a Board of Conciliation those who have accepted the responsibility of taking part in its deliberations, whether as a delegate of one party or the other, or as President, whose duty it is to guide the course of its deliberations, have by such acceptance undertaken to conduct themselves. It was known to every member of the board that the question of minimum wage was a crucial point at issue between the miner and the owner, that the one affirmed that the principle was not only necessary but possible, and that the other equally strongly held that a minimum wage was as a fixed principle both impracticable and impossible. If Mr. Bailey did not know this, he ought never to have accepted the position of delegate of the miners. If, on the other hand, he did know it, it is impossible to understand how he could have imagined that any person presiding at a board of conciliation, or, in fact, at any board, could have been justified (presuming, of course, he was in his senses) in laying down as an axiom and a preliminary principle that there should be a minimum wage. It is one of the, if not the, most important points in issue. No man in his senses could have done otherwise than Lord Shand did, namely, to say this cannot be at once accepted as a basis of the negotiation for adjustment of the differences between the parties, for the present it must be laid aside, and reserved for serious discussion and deliberation. And for doing this Mr. Bailey is pleased to address those most vitally interested as miners in the result of these peaceful and hopeful deliberations. The poor men who listen to him have to take his one-sided view of the situation, his probably highly-coloured account of what took place at the meeting of the board. It is he that proves himself biassed, prejudiced, unreasonable, and consequently unjust, not Lord Shand. That he has not been more successful than he has in inducing his fellow miners to prejudge the position is one of the most hopeful signs that the men are not so ignorant as some would represent them, and that among the great mass of the mining *employés* there is a strong substratum of common sense.

If directors, when they sign cheques on behalf of their company, do not wish to make themselves personally liable, it is well for them to bear in mind that they should not add anything to the name of the company, even for the sake of euphony. The Bastille Syndicate (Limited) is a name, the attractiveness of which may be the ground for two opinions, and, as in actual practice it did not seem to succeed to the satisfaction of the directors, they ventured to add the words "Old Paris" to the name, and the company was in future described on documents as the "Old Paris and Bastille Company (Limited)." Messrs. Tyler and Kish were two of the directors of the concern, and the former also held the office of secretary, and they signed bills on behalf of the company, Tyler and Kish as "directors of," and Tyler as "secretary of," and then followed the company's stamp "Old Paris and Bastille Company (Limited)." The Companies' Act requires every limited company to have its name mentioned in all bills of exchange, signed on behalf of the company. When judgment was applied for personally against the gentlemen who signed the bill, they were unable to successfully contend that the company and not they should have been sued since the company's registered name was not on the bills, and the ingenious argument of defendant's counsel did not avail, for he was unable to convince the Court that a mere addition to the name of the company left the companies name still present. The Court said any other view would lead to confusion, instancing the case of the two firms of bankers, Brown, Shipley, and Co., and Brown, Janson, and Co., an acceptance signed Brown, Janson, Shipley, and Co, would cause some uncertainty, and would prevent the public recognising the firm.

Has the unpaid debenture-holder in a limited company the remedy of the ordinary mortgagee by way of foreclosure? The question is somewhat novel and interesting, and Mr. Justice Kekewich, in the case of Sadler v. Warley, has answered it in the affirmative. The layman should bear in mind the nature of a foreclosure. It is the actual legal conveyance of the property mortgaged. As will be well known, an ordinary mortgage deed purports to legally convey the property mortgaged to the mortgagee, and notwithstanding that on the face of the deed it may appear as an actual conveyance, yet the Court, by its equitable jurisdiction, says that as it was not intended to be anything but a mortgage the deed shall not have the full legal effect which it bears on the face of it. The Court, in fact, puts a stop, as it were, in the interests of fairness upon the operation of the deed. In case of default in payment of the amount secured, the Court removes this stop, and allows the full legal operation of the deed to take effect—this is called foreclosure. In the case before Mr. Justice Kekewich the debenture comprised all the property of the company, including its uncalled capital, and the result of his decree of foreclosure is that the debenture-holder, who held the whole first debentures of the company is entitled to have assigned to him the general assets of the company, including the uncalled capital.

Death of Captain J. Michell.—Captain John Michell, who only within the last few months resigned the charge of Killifreth Mine, died on Friday. Captain Michell had been manager of the mine for about twelve or fifteen years, and it was largely to the miner-like way in which he developed the property that the shareholders owe their present prosperity. He had been in failing health for twelve months or more.

Map of South America.—We have been favoured with a copy of the new map of South America, by Mr. J. G. Bartholomew, F.R.G.S., and have great pleasure in bearing testimony to its artistic qualities and usefulness. It is really one of the best we have seen, and have, therefore, no hesitation in recommending it. It has been revised by Mr. John Samson, F.R.G.S., of the *South American Journal*. It is a fit, as well as useful ornament, for any office. It is issued from the Edinburgh Geographical Institute.

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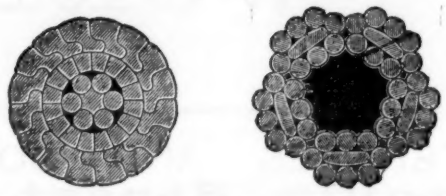

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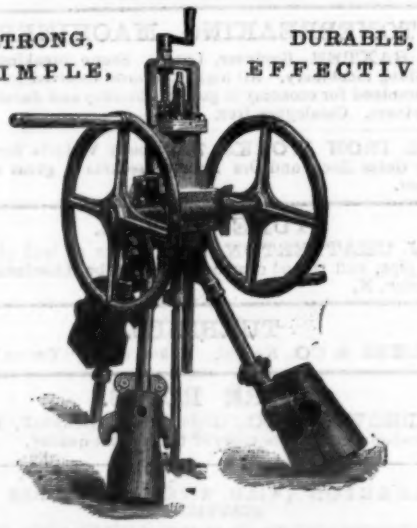

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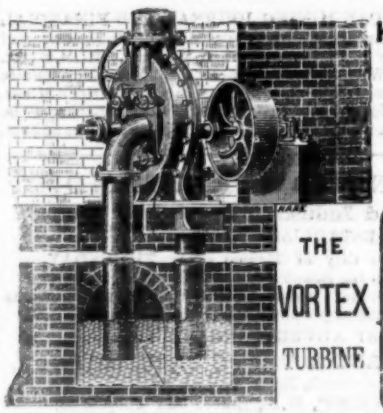

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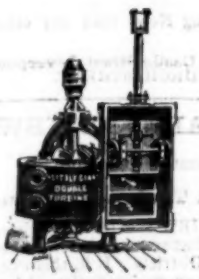

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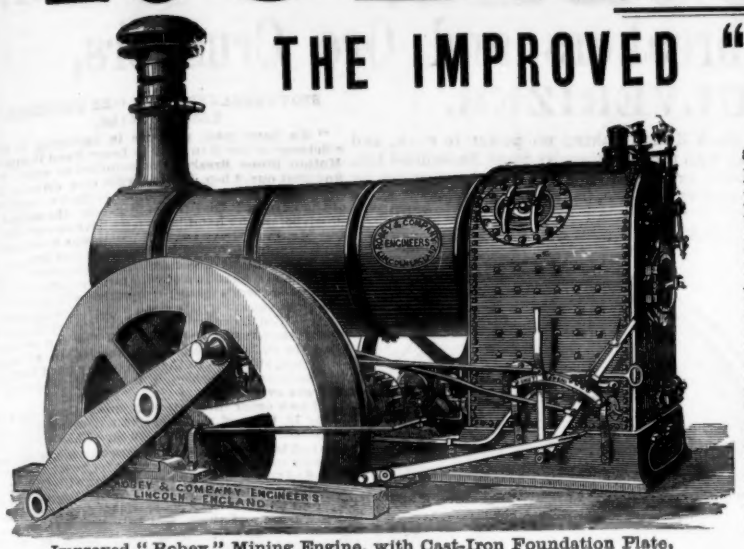

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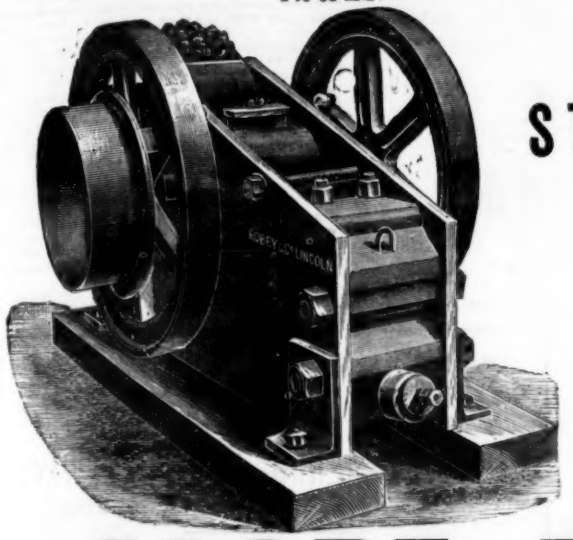

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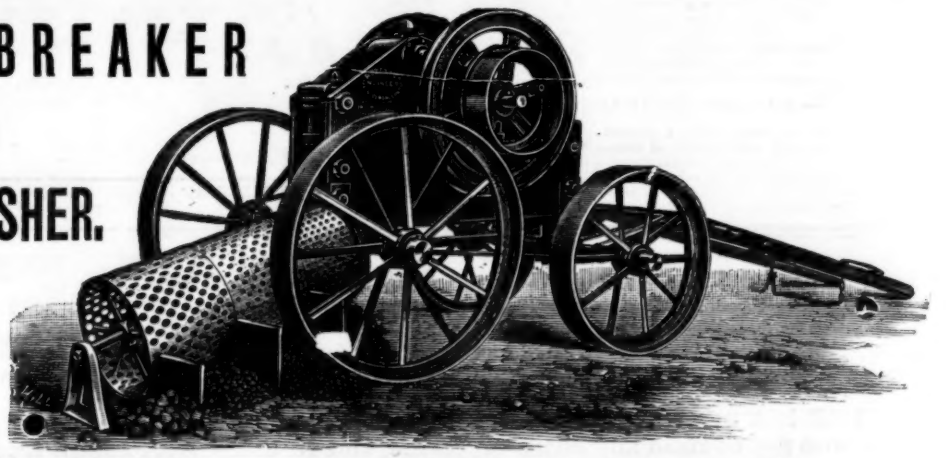

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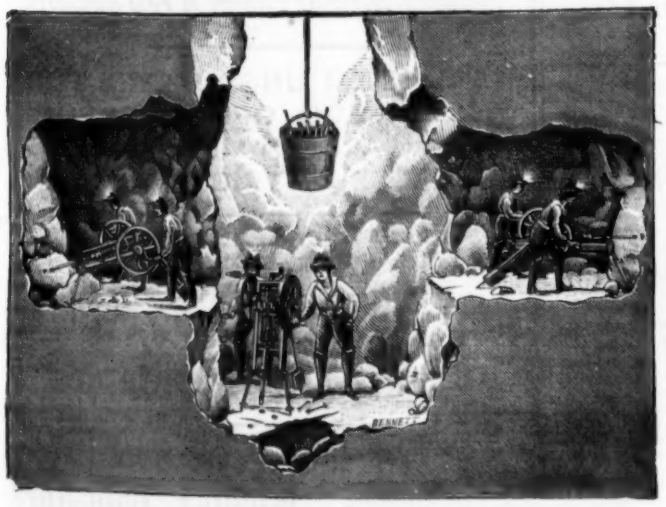

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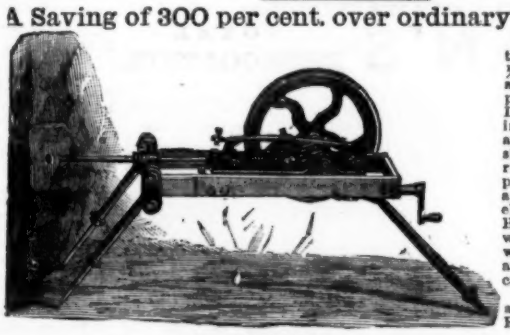

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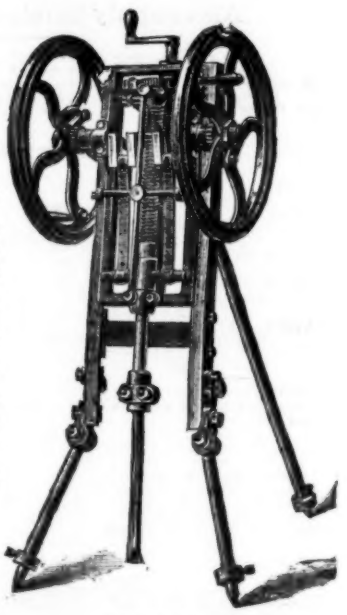

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ADVANTAGES OF USING SETTLE'S PATENT GELATINE WATER-CARTRIDGE:

1.—SAFETY IN BLASTING. 2.—NO SMOKE. 3.—NO SPARK OR FLAME. 4.—NO FUMES. 5.—ALL COAL GOTTEN IN LUMPY CONDITION AND WITH A MUCH SMALLER PERCENTAGE OF SLACK THAN IN BLASTING WITH POWDER. 6.—GREAT SAVING OF COST OWING TO MORE EFFICIENT BLASTING, AND TO REDUCTION OF MANUAL LABOUR. 7.—SIMPLICITY OF THIS METHOD OF BLASTING.

Trained Experts will carry out experiments, and instruct Colliery Managers, Miners, &c., FREE OF CHARGE, on application to Nobel's Explosives Company (Limited), Glasgow, or to their Consulting Engineer.

The use of the WATER-CARTRIDGE is recommended by the Royal Commission on Accidents in Mines.

For full information apply to **NOBEL'S EXPLOSIVES COMPANY** (LIMITED), GLASGOW, or to H. ENFIELD TAYLOR, M.Inst.C.E., the Company's Consulting Engineer, 15, Newgate Street, Chester.

MANUFACTURERS OF GELATINE-DYNAMITE, DYNAMITE, DETONATORS, ETC. ETC.

Awarded the ONLY Gold Medal for Stonebreaker at the International Inventions Exhibition, in competition with all other makes.

THE BLAKE-MARSDEN 1884 Patent

Lever Hand-Hammer Action Stonebreakers and Ore Crushers,

NEW PATENT FINE CRUSHER OR PULVERIZER.

Fitted with Patent Reversible Cubing and Crushing Jaws in Five Sections, and with Surfaced Rocks, requiring no White Metal in fixing. Crucible Cast Steel Levers and Toggle Cushions, Brass or Gun Metal Bearings throughout.

Positive Draw Back Motion taking no power to work, and entirely dispensing with the old expensive Steel Embedded I.R. Spring. The motion or length of Stroke of the Jaw can be increased or decreased at pleasure, to suit any material.

OVER **5000** IN USE.

70 First-Class Gold and Silver Medals.

CATALOGUES FREE.

PULVERIZER TESTIMONIAL

"The Fine Crusher we had from you in August last is an excellent pulverizer, and rapidly reduces hard material to a fine powder."

"The Pulverizer has now been working two months, and answers its purpose most satisfactorily."

"It is with the greatest satisfaction that we write these few lines in order to acquaint you that the 12×3 Pulverizer you provided us with, has quite fully given the results you represented to us, completely reducing our material to an impalpable powder at one operation. Should you refer any one to us we should have much pleasure in recommending the machine."

"I have great pleasure in bearing testimony to the merits and capabilities of your patent combined fine crusher and sieving apparatus. I have tried it on a variety of ores and minerals, and it pulverizes them with equal success. You can put in a small paving stone and bring it out like flour."

"In reply to your favour, I have much pleasure in informing you that the 12×3 Pulverizer we had from you is giving us every satisfaction. The material we are operating on is an exceptionally hard one. I am well satisfied with its working."

"Our experience is that the motion and mechanical arrangements of your machine are the best for pulverizing that we have ever met with"

"The reports from our mines as regards the working of your Fine Crusher (20×5) recently supplied are very favourable, although we cannot quote you exact figures. On being got into position it was tried by hand, with the result that it made short work of the biggest pieces of ore we put into the hopper. You might say how long you would take to deliver another of the same size."

"As I once before stated, your machine is a perfect pulverizer."

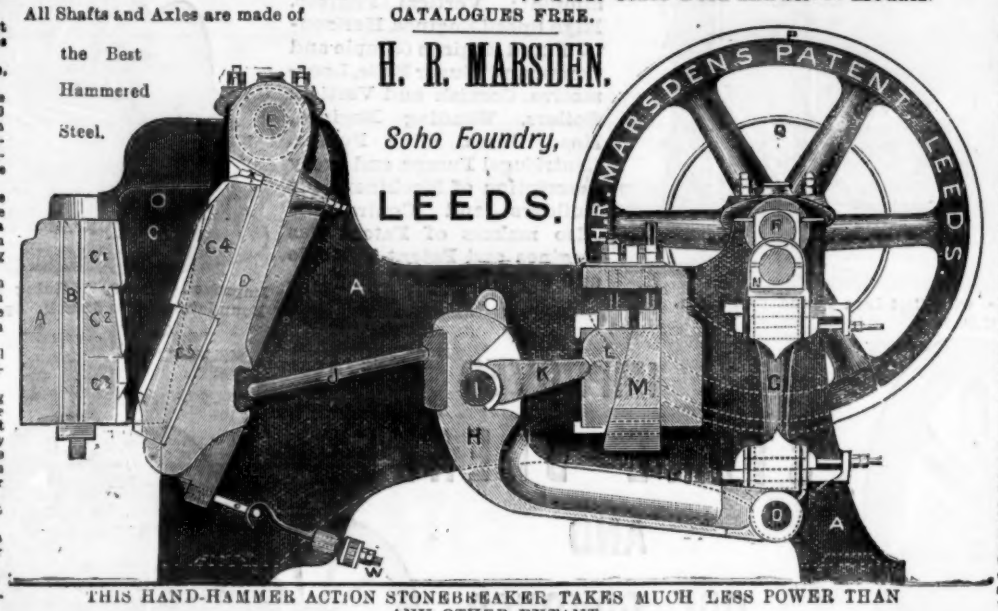
"I am sure the machine will be a success, and a great one, and there is any amount of demand for such a machine. We can work it with 20 lbs. of steam and our engine, which is a 12-h.p., plays with the work, in fact we run the Stonebreaker and the Pulverizer both together with 35 lbs."

All Shafts and Axles are made of the Best Hammered Steel.

H. R. MARSDEN.

Soho Foundry,

LEEDS.



THIS HAND-HAMMER ACTION STONEBREAKER TAKES MUCH LESS POWER THAN ANY OTHER EXTANT.

STONEBREAKERS AND ORE CRUSHERS.
TESTIMONIALS.

"We have great pleasure in testifying to the efficiency of the 15 in. by 8 in Lever Hand Hammer Motion Stone Breaker you supplied us with. We find that our 4 h-p. Engine with ease drives it 255 revolutions per minute, and breaks six ton per hour of the hardest "Diorite" Whinstone: the sample is much before any hand-broken we have ever got done. Our Mr. P. J. Graham, C.E., who was Surveyor of Highways for ten years, before joining our firm, says: It is by far the most economical machine he ever had to do with; he had two of your former make, and two of another firm's make; compared with these four machines your new patent gives the following advantages:—The horse-power required to drive is exactly 40 per cent. less. The sample of the broken macadam is so far superior to that broken by other machines, and even to that broken by hand that we can make no comparison. I is by far the best sample we have ever seen."

"I now order three of your Stone Crushers, size 15 by 10, to be of your very best construction, and to include two extra sets of Jaws and Cheeks for each. The last two 24×13 machines you sent me, which are at work in this colony, are doing very well. You will soon find that the railway contractors will adopt your machines in preference to the colonial ones—two of which I have. I know other contractors have had as many as nine of them, which have not given very good satisfaction. Once they know of yours thoroughly, I believe you will do a good trade with the colonies. For reference of the high character of your constructions you can refer to me as having used them with the very best results, both in New Zealand and this colony, and much prefer them to the colonial article, both in point of construction and less liability to go out of order. The material we are crushing is very hard blue stone, for railway ballast purposes. Push on with the order as quickly as possible; I do not think it necessary to have any engineering inspection. I have brought your machines prominently under the notice of all large contractors in this colony, likewise the Government. Many of the contractors have spoken to me in reference to their capabilities, and I could only tell them that they are by far and away the best and most economical I ever used. The very fact of me having purchased seven from you at various intervals and various sizes, and two above 12 years ago, and having tried all the other makers is sufficient guarantee of the capabilities and the working of your machines. Yours in every way surpass all others."

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BRUISES, CUTS,
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REMARKS.

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Yours truly,
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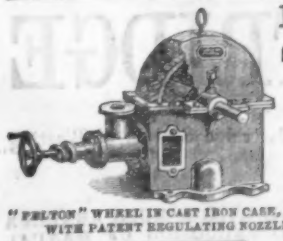
Master of Taunton Vale Hounds.



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